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HEMOCHROMATOSIS: ITS RELATION TO THE METABOLISM OF IRON AND COPPER*

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IN almost all attempts to explain the pathogenesis of hemochromatosis, little if any account is taken of the extreme rarity of the disease in the face of the relatively common occurrence of each of its component elements: cirrhosis of the liver, deposition of iron pigment, and diabetes mellitus. None of these ordinarily progresses into the full-blown picture of bronze diabetes. Hepatic cirrhosis, occurring under a variety of conditions indistinguishable from hemochromatosis, although it may be accompanied by fibrotic changes in the pancreas, spares the islets of Langerhans in most instances and may exist for many years without any disturbance of iron or pigment metabolism[53] (Figs. 1 and 2). Again, the siderosis of the hemolytic types of anemia, or that experimentally produced by repeated intravenous injections of hemoglobin, may lead to deposition of sufficient iron pigment in the hepatic cells to cause atrophy of the surrounding cells, without producing the fibrosis that is so characteristic of even early hemochromatosis.[55] These facts urge one to believe that hemochromatosis is a distinct clinical and pathologic entity, the underlying mechanisms in its production differing essentially from those which cause diabetes mellitus, deposition of iron pigment and hepatic cirrhosis when they occur as separate diseases.

A multiplicity of hypotheses has been advanced as to the etiology of hemochromatosis. The older views are well summarized by Rolleston and McNee. The outstanding feature of the disease is the excess, often enormous amounts of iron-containing pigment in the various organs, from which not even the brain is exempt.[55] The liver alone may contain 33.92 gm. (more than a hundred times the normal amount),[18] whereas chemical analyses by several workers,[1, 6, 12] have indicated accumulation in the pancreas, lymph nodes, suprarenal glands, skin, and elsewhere. The origin of the pigment has been the subject of extensive investigation and much controversy. Absence of the usual signs of excessive hemolysis in the blood and in the bone marrow precludes the view that hemolysis explains the deposits of iron.

Theories of Increased Retention of Iron

That hemochromatosis may be due to perverted iron metabolism was first suggested by Meltzer in 1900. Not until 1913 was the question further investigated by Garrod and his coworkers,[10-12] who concluded that all iron ingested in the food was retained in the body, since they failed to demonstrate the presence of any iron in 5 gm. of dried feces from a patient with hemochromatosis.

The more accurate studies of iron balance made by Howard and Stevens, and McClure, seemed to lend support to this view of retention of food-iron, but a more critical survey of their results, and a consideration of what occurs in normal controls, cast doubts on this seemingly plausible explanation. Reference will be made to this at a later stage.

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This excess of iron in the body suggests either increased absorption or decreased elimination. Both processes may participate in a general metabolic disturbance.

Increased absorption.—The recent studies which have been made on the influence of copper as an adjunct to iron therapy in certain forms of anemia[9, 17, 22, 24, 28] raises the question as to whether the enhanced beneficial effects are attributable to increased absorption or increased utilization of iron. That copper does not influence the total amount of iron retained in experimental animals has clearly been shown by Josephs.[23] It appears that although copper is not a molecular constituent of hemoglobin, it is a necessary catalyzer in formation of hemoglobin, in much the same way as iron functions in the production of chlorophyl. There is no reason to believe that copper may be a factor in determining the accumulation of iron in hemochromatosis by increasing absorption.

Decreased elimination.—Where iron accumulates in the body to the same extent as in hemochromatosis, under conditions such as are met in pernicious anemia and the types of hemolytic anemia in general, the pathologic states seem to be entirely different. In cases of pernicious anemia, thus, iron is eliminated in large amounts during remissions of the disease.[50] The avenues by which this excretion of iron is effected have not been finally determined; presumably the large intestine excretes a part,[7] and it has been shown that the bile contains appreciable amounts of iron at all times.[5] Direct information is not available as to what part of the increase of iron put out in these cases of controlled Addison's anemia can be attributed to the liver.

There is evidence that during the remissions of pernicious anemia (besides mobilization of the deposited iron pigment) the liver is better able to excrete bilirubin,[16, 20] a function which we know falls within its physiologic activities. Does it follow, as Rous and Oliver[55] have suggested, that the cirrhotic liver of hemochromatosis fails to deal adequately with the iron-containing product resulting from normal destruction of blood, and that this leads to passive accumulation in the organism? What follows, however, seems to argue against such an assumption.

The distribution of iron differs significantly in various abnormal states, a fact which is again stressed in support of the suggestion made at the outset, that the underlying mechanism of hemosiderosis in hemochromatosis differs essentially from that in the conditions under consideration. In experimental animals, in which hemosiderosis can be produced by repeated transfusions of blood, there is an accumulation of iron pigment in the spleen and in the bone marrow to the limit of their capacity of storage. After this only does the liver begin to be pigmented, a condition quite the reverse in hemochromatosis, in which, moreover, the source of iron is in all probability not directly hematogenic.

If the accumulation of iron pigment depends on faulty excretion, then the explanations offered so far are somewhat inadequate. Whipple[61] has agreed with the view that elimination is faulty, but not as a result of disease in the liver. He has regarded disposal of pigment (as well as production of pigment) as dependent on a dynamic protoplasmic function, the derangement of which may lead to a heaping up of pigment (present in traces under normal conditions), in amounts which are to the detriment of, and which finally bring about, destruction of the cells harboring them. Such a disturbance of the whole intracellular metabolism of pigment would adequately explain a morbid process such as hemochromatosis. The manner in which such a disturbance may be brought about is to be considered later.

Theory of Intoxication by Copper

During the past decade, the possibility that hemochromatosis is a manifestation of chronic intoxication from copper has been studied by numerous workers,[2, 11, 14, 15, 27, 31-35, 40, 48, 56, 60] but no uniformity has arisen out of their results. The facts have been so well reviewed by Lindow, Peterson and Steenbock[29] as well as by Flinn and Inouye,[10] that the reader is referred to their respective papers.

The part played by copper in formation of hemoglobin has shed light on a new angle of the subject, and has renewed a controversy concerning the toxic effects of the metal; out of this controversy a voluminous literature revealing important data of both clinical and pathologic interest has arisen.

Copper occurs throughout the plant and animal kingdoms, not as an adventitious contaminant, but, as recent work has shown, serving important functions. Minute doses of copper will de-

stroy organisms, but protein, to which the metal has close affinity, will inhibit this, so that while copper may be regarded as a protoplasmic poison in the general sense of the term, its toxicity is reduced by combination with the proteins of the food and the mucin of the gastro-intestinal canal. But from the facts which follow, it is evident that the metal is absorbed by the organisms from the bowel (and probably through the mucosa of the respiratory apparatus) and feeding of copper to animals leads to marked increase in the absolute content of copper,[10] especially in the liver, which becomes its chief depository. Although this observation had already been made in 1914 by Corper, who set out ostensibly to test the therapeutic value of copper against the development of experimental tuberculosis, it seems to have escaped the notice of many observers who have drawn conclusions as to the toxicity of the metal on the basis of the copper content of livers in the presence of various diseases. That its toxicity may adversely affect the liver under certain conditions is possible, in which case the hepatic injury and the subsequent cirrhosis would seem to depend more on the individual susceptibility than on the amount of copper present in the liver. Viewed from this standpoint, and considering the fluctuations in the amounts of exogenous copper which may enter the organism at various times, it hardly seems unusual that the analysis of livers for copper by different workers should yield widely divergent results in the same pathologic condition.[12, 19]

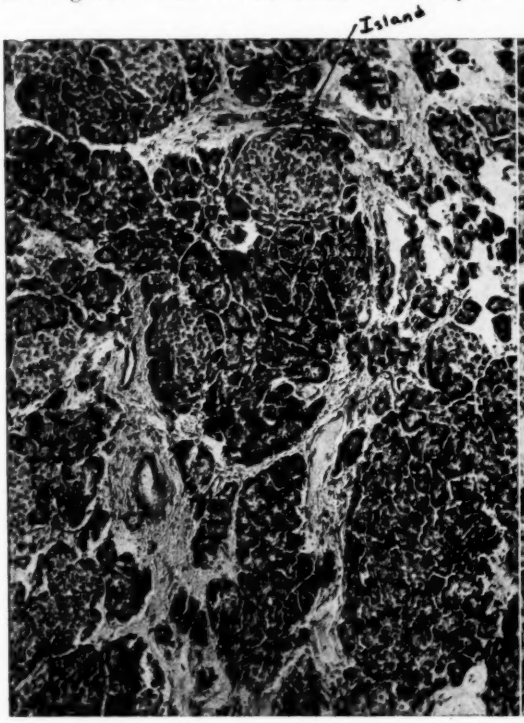

Fig. 1. Section of pancreas from a patient with biliary cirrhosis who had terminal jaundice and ascites. There is marked fibrosis. The islets of Langerhans are well preserved.

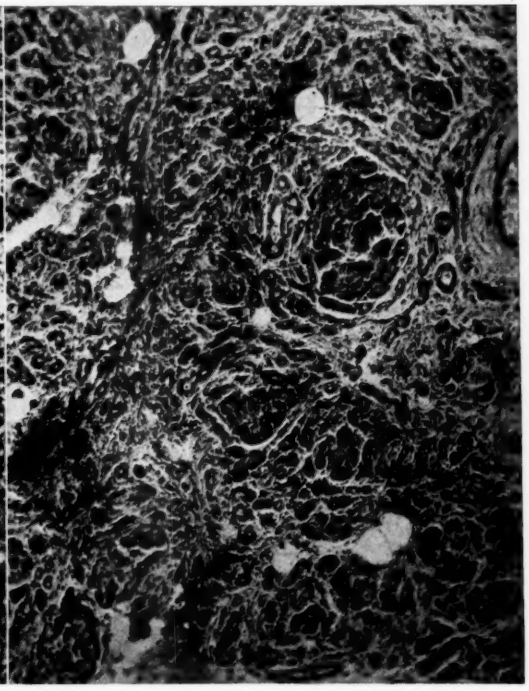

Fig. 2. Section of pancreas from a patient with hemochromatosis. There is marked fibrosis from deposition of iron pigment. The islets of Langerhans are absent.

The effects of large doses of copper over long periods of time need not be discussed here, but the bulk of the evidence points to the fact that the body can handle large doses of copper without demonstrable deleterious effects in most instances.

Furthermore, it is hard to reconcile the fact that copper is essentially a protoplasmic poison with the findings that the liver[42] of the newly-born animal contains more copper than that of the adult, and that it is more abundant in the actively growing cells than in older parts of green plants.[37] It has been shown, moreover, that in

advanced carcinoma, and in pregnancy, the serum contains an increased amount of copper.[30] With this group of conditions, in which the predominating factor common to all is cellular growth, it would seem that the catalytic activity exhibited by copper in hemopoiesis may very well be the explanation for the findings recorded. Finally, it seems more than coincidental that in a group of cirrhotic livers studied by Herkel, those described by him as hypertrophic (apparently those with more active and with a larger amount of hepatic parenchyma) contained more copper than those labelled "atrophic," an epithet seemingly appended to the more fibrotic organs. If copper caused cirrhosis of these livers, the more severely injured livers, and those in which its action had been more prolonged, would be expected to contain larger amounts of the substance responsible for the pathologic condition. Yet the direct reverse of this occurs in the recorded findings.

Whatever the part played by copper may be in the body, it is obvious that the liver is concerned with its metabolism. It is the organ through which part of the absorbed copper is eliminated, and bile of man contains copper in varying amounts at all times.[5] Under normal conditions the amounts excreted would be expected to fluctuate with the intake. The amount actually required by the body for formation of hemoglobin, at least, is so small that that which is present as an impurity in the preparations of iron commonly prescribed in certain forms of secondary anemia and that which is contained in food, suffices. Under conditions of increased intake of copper, the amount excreted in the bile definitely increases, as shown by the experiments of Flinn and Inouye, and in Mallory's[33, 34] animals subjected to large doses of injected copper, he demonstrated copper microscopically in the inspissated bile, while pigment gallstones have been shown to contain copper in amounts up to 10,000 mg. for each kilogram.[57]

Oshima and Schönheimer found the livers in seventeen cases of hemochromatosis to contain three to four times the normal amount of copper. However, in a study of a series of cases of nonpigmentary cirrhosis, Herkel pointed out that although in two cases the content of copper was normal, in eight others it was as high as was claimed to occur in hemochromatosis. A typical case of hemochromatosis in which the patient recently came to necropsy at The Mayo Clinic was studied in this respect. Analyses showed 0.72 mg. of copper and 930 mg. of iron for each 100 gm. of liver. The amount of copper in this liver was about 7.2 mg. for each kilogram, as compared to amounts ranging from 5.5 to 113.6 mg. of copper for each kilogram in Herkel's cases of nonpigmentary cirrhosis.

It must be admitted, therefore, that copper, when found to be present in the body, cannot summarily be regarded as a foreign toxic substance necessarily exerting deleterious effects. That it plays an important part in the animal economy and enters into the complicated mineral metabolic processes seem to be beyond cavil, while its predilection for the liver and its constant presence in the bile under normal conditions cannot be without significance. Still less is it justifiable to conclude that it is the sole cause of the widespread pathologic change and protein manifestations of hemochromatosis, even if it will, under special circumstances, lead to cirrhotic changes in the liver.

In order to determine whether more extensive studies of iron balance in a case of hemochromatosis would throw more light on the problems of the disease and of the iron metabolism, chemical studies were undertaken. The details of the study follow:

Report of Case

A man, aged fifty-nine years, was admitted to The Mayo Clinic in October, 1931. Between the ages of fifteen and twenty years he was concerned with gold mining and milling in California, after which he became engaged in a copper mine in Mexico for two years. During this latter period his occupation exposed him to the metallic fumes arising from the smelting process, and which he states were known to contain zinc, silver, arsenic and lead in addition to copper. For more than forty years he had been chewing the same brand of tobacco. This contained on chemical analysis 5 mg. of copper for every 100 gm. of tobacco. When in Mexico the patient contracted malaria, dysentery, and typhoid fever. He never became a chronic malarial subject. His gallbladder was removed for cholelithiasis ten years before his admission to the clinic.

So far as the present illness is concerned, the patient had had diabetic symptoms since 1928, and he had been treated for diabetes. Both his diet and the dose of insulin required frequent readjustment on account of marked instability in the level of blood sugar, resulting at times in distressing insulin reactions. Shortly before he came to the clinic it had been found elsewhere that he had an enlarged liver and splenomegaly. Roentgenologic evidence pointed to a mass in the epigastrium which was subsequently shown to be a large diverticulum on the superior border of the third part of the

duodenum, and to have no bearing on the pathologic condition present. He had been receiving medical attention at frequent intervals since 1928 so that the enlargement of the liver and spleen recently discovered apparently developed after the onset of the diabetes. The basal metabolic rate, determined elsewhere, was found to be sufficiently low to warrant administration of thyroid, but despite its use the patient still had not been relieved of the symptoms of fatigability and intolerance to cold. He further complained of headaches, constipation, and inability to control the symptoms of diabetes. The history was otherwise essentially negative.

Physical examination revealed bronzing of the skin of the exposed parts, not unlike that due to sunburn, but on closer inspection a definitely metallic hue was discernible. There was moderate enlargement of the liver and of the spleen. The thyroid gland was palpable.

The blood was essentially normal, but, in order that the report may be complete, the details will be given: hemoglobin 14.2 gm. for each 100 c.c., erythrocytes 4,000,000, and leukocytes 5,000 to 6,000 in each cubic millimeter of blood. The morphologic characteristics of the blood and the differential count were normal. Fragility of erythrocytes was normal. The proportion of reticulocytes was 1.6 per cent. Blood smears did not contain parasites. The serologic test for syphilis was negative. The iron content of the whole blood was 42.2 mg. and 43.3 mg. in each 100 c.c. respectively before and after administration of iron. Determinations of blood sugar varied between 0.08 and 0.20 mg. in each 100 c.c. Tests of hepatic function disclosed no retention of dye. The value for bilirubin was 3.1 mg. in each 100 c.c. of serum. The van den Bergh reaction was indirect and delayed. There were varying amounts of sugar in the urine at different times, and 0.04 mg. of lead in each 1,500 c.c., but the urine was otherwise normal. Copper or crystals of hemosiderin could not be recovered from the urine. The thorax was normal to roentgenologic examination. The stomach was normal. There was a large diverticulum on the superior border of the third portion of the duodenum. The colon was normal. Fractional examination of gastric content after a test meal gave negative results. Examinations of stool were negative.

A specimen of skin taken for biopsy from the inner surface of the arm disclosed the presence of iron pigment in the propria of the sweat glands and about the capillaries of the upper part of the cutis. This has been described as diagnostic[41] for hemochromatosis (Fig. 3).

The single period studies previously reported seem inadequate for complicated metabolic experiments, so an attempt was made in the present study to determine the iron balance over longer intervals. The details of three periods (each lasting three days) are complete for critical analysis as shown in Table 1. No positive conclusions are drawn from the incomplete results of periods 2 and 5 because of the loss of parts of the specimens through breakage of receptacles. During periods 4 and 5, the ordinary diabetic diet, slightly modified for simplifying the studies, was supplemented with large doses of iron in the form of ferric citrate.

Homogeneous foods were selected, so that the portion used for analysis would be of the same composition as the food eaten. For instance, bacon was rejected because all pieces do not have the same proportion of

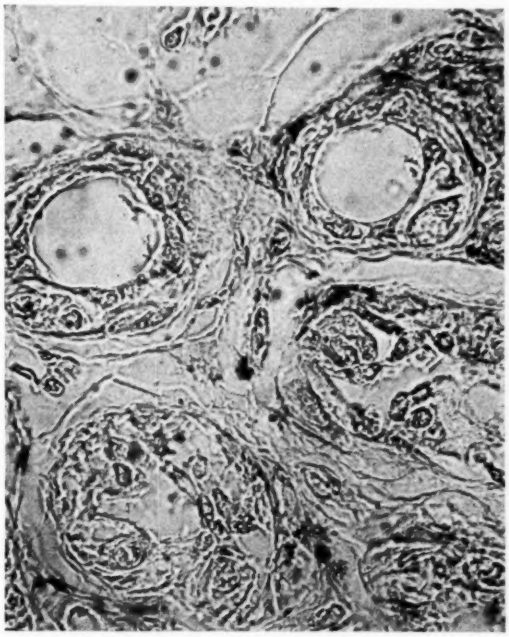

Fig. 3. Iron pigment in the propria of the sweat glands and about the capillaries of the upper part of the cutis (Mallory's potassium ferrocyanide stain).

lean and fat, and bread was served with all crust removed. Large oranges and tomatoes were used so that the part sent to the laboratory came from the same piece of fruit that was eaten.

TABLE I

STUDY OF IRON BALANCE

Period	Duration, days	Intake of iron in food, mg.		Intake of iron as ferric citrate, mg.	Total intake of iron, mg.	Iron excreted, mg.			Balance, mg.
		Calculation	Analysis			Feces	Urine	Total	
1	3	31.12	20.1	0	20.1	11.7	0.74	12.44	+7.66
2	4	50.00	Lost	0		55.5	0.70	56.4	-
3	3	37.54	26.6	0	26.6	25.6	2.08	27.88	-1.28
4	3	37.44	32.3	935.0	967.3	714.3	1.09	715.39	+252
5	3	37.54	Lost	920.0	920+	906.0	1.05	907.05	+

In order to obviate errors in weighing, tenth portions of foods which were included in more than one meal were weighed at one time at the end of the day. Bread used throughout one day, therefore, was taken from the same loaf, cream from the same bottle, and butter from the same block.

Effort was also made to avoid contamination with

iron. Oranges were not sliced but sectioned. Aluminum utensils were used in cooking, and all foods were handled with silver forks and spoons. Bread, however, was sliced with a steel knife, but the crusts were broken off the edge, not cut. Triply distilled water was used throughout the experiment. The patient coöperated perfectly and no food was ever returned.

The urine for the corresponding period was collected in glass containers. Stools were collected in enamel dishes and pooled for the corresponding period of study. The different periods were "marked off" by the use of carmine in some instances and charcoal in others, as accurately as possible. All possible contamination with iron was avoided by keeping the specimens covered, and using wooden utensils in handling or transferring material.

Chemical analyses of urine were begun by adding a known volume of hydrochloric acid until the specimen was acid. One-tenth of the specimen was evaporated to dryness in a casserole, and was ashed in a muffle furnace until white, crystalline ash was obtained. To this ash, 5 c.c. of concentrated nitric acid was added, and this was evaporated to dryness in order to convert all iron into the soluble ferric salts. Then the nitric acid was distilled off by adding 5 c.c. of concentrated hydrochloric acid, and this again was evaporated to dryness. The residue was dissolved and made up to suitable volume, and the content of iron was estimated by the colorimetric method to be described.

The pooled specimens of feces for chemical analysis were dried over a steam bath. The specimens were numbered for record and, although the records will not be reproduced here, the numbers will be retained in the text. Specimens 1 and 3 were weighed, were powdered in a mortar, and an aliquot portion (5 gm.) was ashed in a muffle furnace. Oxidation was similarly completed by the use of concentrated nitric acid, and the latter was distilled off. The specimen was dissolved and made up to a suitable volume for colorimetric estimation of its content of iron. Specimens 2, 4 and 5 could not be satisfactorily powdered and were treated with concentrated nitric acid on a steam bath; the nitric acid was later distilled off with hydrochloric acid to dryness. The specimens were ashed, and the procedure then followed the method employed for specimens 1 and 3. The amounts of nitric and of hydrochloric acid used in the various stages of the analyses were all verified, so that the iron contained in them, if of significant amount, could later be deducted from the amounts of iron in the corresponding specimen.

As related before, a tenth portion of each day's food was saved for analysis. Specimens were boiled with successive portions of nitric and of hydrochloric acid. Due to the high content of fat, the specimens could not be directly ashed. Therefore the fat was first extracted with petroleum ether, and the partially fat-freed material was charred. Then the petroleum ether extract was added in small portions to the latter again, and the ether was evaporated off over a steam bath. In this way all the fat was slowly replaced with the remainder of the specimen and charred. The containers were kept covered with glass all the time, so that any material which might have escaped in the process of charring was caught on the watch glass and washed back into the specimen.

After being thoroughly dried over a steam bath, the specimens were ashed in a muffle furnace, the ash being dissolved as before and made up to convenient volume for analysis by colorimetric methods. Unfortunately, specimens of foods 2 and 5 were lost through breakage of the containers during transit.

Of the nitric acid used, a portion of 100 c.c., and of the hydrochloric acid, 200 c.c., were evaporated to dryness, dissolved, and made up to suitable volume for estimation of content of iron. The nitric acid was found to contain 0.0115 mg. of iron in each 100 c.c.; the hydrochloric acid, 0.0059 mg. of iron in each 100 c.c.

Of the ferric citrate used, 100 mg. was accurately weighed, ashed in the muffle furnace, redissolved, and made up to convenient volume for colorimetric determination of content of iron. It was found that 100 mg. of the ferric citrate used contained 15.87 mg. of iron.

Determination of the content of iron of each of the solutions prepared depended on the formation of the complex resulting from the combination of soluble ferric salts with ammonium cyanate. This was extracted by means of amyl alcohol as described by Kennedy, thus avoiding the difficulty of fading of colors as experienced in the method described by Elvehjem[8] unless phosphates were previously removed. A drop of permanganate was also added to all specimens tested to insure complete oxidation of the iron salts into the ferric form. Ferrous ammonium sulphate (anhydrous) was used as a standard, to which permanganate solution was added to slight excess. Actual determinations were done by colorimeter. Analyses were made in triplicate.

In the first period there was retention of 7.66 mg. of iron. The second period had to be discounted on account of the loss of the specimen of food, but in all probability the subject was in negative balance, since the iron excreted exceeded the iron in the food as calculated from Sherman's tables. These tables gave, in all cases, as other workers[26, 54] have found, figures higher than those obtained by actual chemical analysis. The third period showed a negative balance of the almost negligible amount of 1.28 mg. of iron. When the intake of iron was increased to the amount that it was in the fourth period, there was a massive retention of 252 mg. of iron, that is, 84 mg. a day. In the fifth period there was retention of a much smaller amount of iron, the actual figure being unavailable on account of the loss of food of that period. Since, however, it was small in comparison with the 920 mg. of iron administered in the form of ferric citrate, it cannot appreciably alter the result of that period.

Comment

Studies on normal subjects indicate that the requirement of iron varies somewhat with different persons, and, based on the principle of demand and supply, it varies with the same person from time to time. Thus, subjects studied by

Leichsenring and Flor[26] were all in positive balance on from 2.12 to 3.64 mg. of iron each day, and the investigators calculated the maintenance requirement to vary from 0.274 to 0.377 mg. for each kilogram of body weight each day. In similar cases, studied by Rose and her coworkers, however, subjects were all in negative balance in from 4.58 to 4.70 mg. a day, with the calculated maintenance requirements of 0.41 mg. for each kilogram of body weight, an amount rather higher than that found by the former investigators. Still more interesting is the fact that Reznikoff found a normal person to store 382.8 mg. of iron over a period of seven months, whereas in a case of polycythemia vera, in which there was increased hemolysis due to treatment with phenylhydrazine, 852.4 mg. of iron was stored over a corresponding period on a normal intake of food-iron. There appears, then, not to be a necessary correlation between the number of erythrocytes, the amount of hemoglobin and the iron balance.

Howard and Stevens obtained retention of 0.5 mg. of iron each day without recovering any iron from the urine. However, the amount of iron in the urine may exceed 0.5 mg., so that their subject may actually have been in negative balance.

In McClure's studies of iron balance in a case of hemochromatosis, the intake was 240 mg. in five days, about five times the normal intake, with a retention of 48 mg. over the period of study (that is, 20 per cent of the intake). Allowing for the iron excreted in the urine (which has been omitted in his calculation) the retention is still appreciable. But Leichsenring and Flor also made the observation that storage of iron immediately increased in normal subjects when the intake was doubled.

The results in period four of this study were identical with those just described. Why retention to the same degree was not seen in period five is difficult to explain on any other basis than that of supply and demand. It would seem that the previous high intake more than supplied the needs for further storage of iron. In the same way it is difficult to account for the fact that in some of the other periods there was storage, whereas in others, on practically the same intake, the subject was in negative balance.

On the whole the results obtained in this study of balance do not deviate appreciably from those obtained before in studies of subjects with hemochromatosis and in studies of normal subjects.

In evaluating the results of such studies of iron balance, and in seeking for the explanation of hemochromatosis, the facts which have already been established regarding the normal metabolism of iron must be reviewed. Here again these phases must be recognized: (1) its sources and its absorption; (2) its distribution and storage; and (3) its excretion.

It has been shown by microchemical methods that iron is absorbed mainly from the stomach and the upper part of the jejunum. The iron has been traced successively to the mesenteric lymph nodes, the spleen, the bone marrow and the liver. At a still later stage, granules of iron are said to be present in the mucosa of the cecum and the colon, where in the earlier stages of the experiment it had been absent. The usual assumption is that it is excreted by the large bowel.

Under ordinary circumstances, the iron contained in a normal diet (10 to 12 mg.) meets the demands necessary to maintain the metabolic process in which iron has been shown to share. Contrary to the usual supposition, this food-iron is mainly in the form of inorganic compounds.[9]

Recognizing the part which iron plays in formation of hemoglobin and in growth (since it is an important constituent of the nuclear structure of cells) little is known about its fate, once it is absorbed. It is not within the scope of this paper to consider the details of formation of hemoglobin beyond stating that food-iron, or iron therapeutically administered, plays an active part in the restoration of hemoglobin in at least some forms of anemia, particularly, as has already been mentioned, in the presence of small amounts of copper. But this is only one phase of the metabolism of iron.

The normal body contains about 3 gm. of iron, of which about a half is contained in the hemoglobin.[59] Whole blood contains 44.84 mg. of iron for each 100 c.c. in young men[46]; 42.48 mg. for each 100 c.c. in young women; and 42.74 mg. for each 100 c.c. in a mixed group. Butterfield studied the iron content of the hemoglobin in different diseases and concluded that the normal figure is 0.34 per cent. Since hemoglobin is a definite chemical compound, its percentage of iron must therefore be a constant figure under all conditions. Riecker has drawn attention to what he termed a "partly diffusible iron compound" in the serum (normal 1.1 ± 0.022 mg. for each 100 c.c. of serum) which, according to his investigations, falls below normal in the iron deficiency

types of anemia such as follow continuous hemorrhages or dietary deficiency of iron. Riecker claimed that it forms a reliable criterion of the degree of iron deprivation and that normal values again can be established by suitable medication with iron, leading to restoration of the anemia and to clinical improvement of the patient. Again, in hemolytic anemia he found it to be increased. All these observations have since been confirmed by Locke and his coworkers.[30] Most of the organs contain only a trace of iron, and according to Morse this amounts to 0.01 per cent or less. The liver contains about 0.2 per cent.

Finally, the iron resulting from the normal process of hemolysis must be accounted for. Broadly speaking, the iron so released is in part excreted and in part utilized once again in the hemopoietic process, the iron-free fraction of hemoglobin being eliminated in the bile as bilirubin.[36]

In the further analysis of this process, many important facts relating to the intrinsic iron metabolism are found to be lacking. It does appear that a breakdown of freed hemoglobin, into its structural units, is necessary before the iron-containing material can enter once again into the molecule of hemoglobin. Elvehjem has proved by experimental methods that inorganic iron is more readily available for hemopoiesis than is organic iron, indicating how firmly and intimately iron is bound in the organic compounds such as hemoglobin. Similarly, the changes which food-iron undergoes in the alimentary tract and in the organism after absorption are not definitely known. But it seems likely that in the liver[7] it is changed to indissociable compounds, several of which have been found, and that it passes through several intermediate compounds before it is utilizable for formation of hemoglobin. Ferratin is regarded as one of these intermediate compounds.

The conditions under which hemolysis occurs in excess, and in experimental hemoglobinemia, throw light on the normal processes of intrinsic metabolism of iron. Here the spleen, bone marrow, liver and kidney contain excess amounts of iron. The view that the liver possesses a special ability to remove free hemoglobin from the blood stream was expressed by McMaster, Rous and Larimore. More recently, the work of Muir and Young, based on experimental hemoglobinemia and on microchemical studies of the liver, suggests that neither the hepatic cells nor the Kupfer cells take up hemoglobin as such, nor is hemoglobin excreted in the bile. It appears that iron reaches the liver secondarily, from deposits elsewhere, not as hemoglobin but in some other form, for whereas a distinct iron reaction is obtained in the renal cells in the early part of the experiment, this iron can be demonstrated in the liver only at a later stage.

Under normal conditions the body excretes about 10 mg. of iron daily, mainly in the feces.[52] Whether this includes the fraction so constantly recoverable from the bile is a matter for conjecture. The question of an enterohepatic circulation of iron may be raised. It seems not unreasonable to suggest that the iron excreted in the bile has been changed into a form suitable for hemopoiesis and that it is reabsorbed from the bowel to enter into the formation of hemoglobin. Iron is excreted in lesser amounts in the urine. Under conditions where hemolysis occurs to extreme degrees, hemoglobinuria may result, the amount of iron so excreted by the kidneys being proportional to the degree of hemolysis.[44]

The facts reviewed would indicate, among other things, that under normal conditions the body stores appreciable amounts of raw material for hemopoiesis, but whether the iron moiety is always in a utilizable form for formation of hemoglobin is entirely a different matter.

In considering the pigment metabolism as a whole, Whipple[61, 62] assumed the existence of a "pigment complex" containing the essential parts of all the mature body pigments (including the iron-containing and hemoglobin-forming elements) scattered throughout the reticulo-endothelial system. This he represented graphically, indicating that the food, as well as the products of hemolysis and of the tissue cells, contribute to the pigment complex, and that it is the source of the essential elements for the building up of hemoglobin as well as for formation of bile and urinary pigment. Whether this conception is correct in its detail is unimportant, but it, too, stresses the idea of the existence of stores of the essential elements for regeneration of blood in the body at all times.

The iron content of the body may thus be subdivided into: (1) the hemoglobin iron, which constitutes 0.34 per cent of the hemoglobin[3]; and (2) the nonhemoglobin iron. The latter may be conveniently subdivided, and the first subdivision comprises "the function iron of the tissues" or "fixed iron" recently studied by Josephs[23] in ani-

mals and regarded by him as the iron of the cell nucleus. This is less constant than the hemoglobin iron, but a definite minimum level must at all costs be maintained at the expense of even the hemoglobin iron, and later at the expense of the growth of the animal during periods of iron starvation. Figure 4 illustrates the fall in the value of nonhemoglobin iron during iron deprivation to a level which cannot be reduced below 2 to 3 mg. for each 100 c.c. in the liver or 0.5 mg. for each 100 c.c. in the body as a whole. Josephs has produced experimental evidence to show that copper causes no apparent increase in the amount of "function iron" in the body, since in his feeding experiments the concentration of the tissue iron was not appreciably higher when copper and iron were administered together than when milk alone was given. On the contrary, in fact, when formation of hemoglobin was stimulated by administration of copper and iron the function iron actually decreased, but again never below the same minimal level obtained in the experiment cited.

The second subdivision of the nonhemoglobin iron is the stored or "mobile iron." This is extremely variable, depending on both exogenous (food iron) and endogenous factors (hemolysis and general cellular disintegration) which may cause wide fluctuations in this fraction of body iron. This conception and subdivision of the iron content of the tissues explain the apparent paradoxes encountered in the studies of balance previously described. The mobile iron serves as the source of hemoglobin iron which is changed in the liver to a suitable hemopoietic form. The view is here expressed that the "bile iron" is this iron or a part of it. It is impossible at this stage to state whether Riecker's[48] partly diffusible iron compound in the serum falls under this heading.

The metabolism of iron with particular reference to hemochromatosis.—The importance of the facts reviewed in understanding certain of the features of hemochromatosis is that iron pigment may be, under circumstances in which it is known to be in excess, widely distributed throughout the various organs and yet be out of currency, due to the inability on the part of the cells harboring it to excrete it. At the same time, although it may also be out of currency for hemopoiesis, there still remain the usual sources of iron for building of hemoglobin, so that anemia need not occur as a result of deficiency of iron.

In carrying out a study of iron balance the only concern is with the beginning stages and

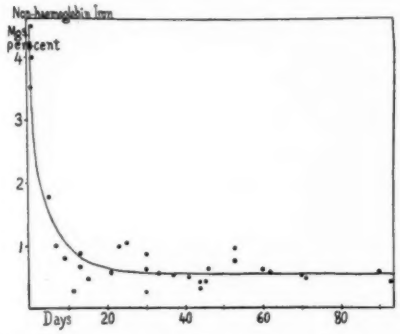

Fig. 4. Concentration of nonhemoglobin iron in rats fed milk only indicating a drop to a certain irreducible level (Josephs).

the final stages of a complex mechanism, the most important aspects of which remain untouched. The capacity of the body to store substances further complicates the study from this standpoint, particularly as the laws which govern excretion and absorption of such a substance are not well understood. Furthermore, determination of the iron content of the food and of the feces can have at the most a relative value, since, in estimating these amounts of iron in the feces, a certain proportion of this iron represents unabsorbed iron, taken by mouth, so that the actual amount excreted by the body remains an unknown quantity as much as the amount actually absorbed remains an unknown quantity. These facts are well illustrated by the accompanying diagram (Fig. 5).

However, if hemochromatosis is simply the result of retained food iron in amounts which will, during the known clinical duration of the disease, give rise to the accumulation of as much as 40 gm. or more (as in Sheldon's case), then, as Wilder has pointed out, the daily retention will be readily detectable in such an experiment. Mathematically, thus, he showed that it will require the daily retention of 20 mg. to accumulate the named amount over a period of five years, which is impossible, since the total intake of iron is usually less than this, and since there is, in addition, a daily loss of iron from the body even on a normal intake as is shown by our study as well as the previous balance experiments already referred to. In carrying this thought further

it cannot but be concluded that not only must the periods of retention of iron be much longer than five years, but probably extended to the duration of the patient's life, during which accumulation occurs slowly and in amounts which could not be determinable experimentally.

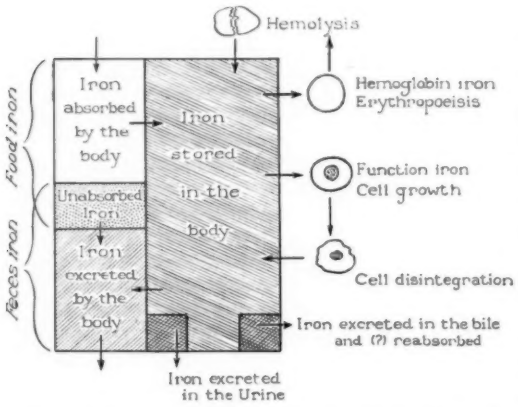

Fig. 5. Diagrammatic representation of the metabolism of iron, indicating: (1) the unabsorbed food iron excreted in the feces; (2) iron stores acting as a source of hemoglobin iron and the "function iron" for cell growth, and receiving the iron resulting from cellular disintegration and hemolysis in addition to absorbed iron; (3) iron excreted in the urine and in the bile. The serum iron is not indicated in this figure.

That a disturbance exists which interferes with the normal series of changes which complete the cycle of absorption, utilization, and the chain of events before final excretion of iron seems to be the probable explanation of hemochromatosis. It is justifiable to conclude that hemochromatosis is the result of faulty elimination of iron, the result of an inborn error of metabolism expressing itself (as Whipple has postulated)[61, 62] as a disturbed intracellular circulation of iron, leading to increase in the amounts normally present, with ultimate destruction of the cell and replacement by fibrous tissue.

The rarity with which the disease affects women often has aroused comment. Mills[39a] described the case of a woman thirty-one years of age, and mentioned two reports of disputed cases found in the literature. For the infrequency of the disease among women there seems to be no explanation. But then, there is no explanation of why gout, a metabolic disorder of a different kind, should occur almost exclusively among men.

Summary and Conclusions

An endeavor has been made to show that hemochromatosis is a definite clinical as well as pathologic entity, that the mechanism underlying the cirrhotic and pigmentary changes as well as the diabetic syndrome of hemochromatosis is not explicable on the basis of that which ordinarily leads to these conditions when they occur as separate diseases. The multiplicity of hypotheses as to the etiology of hemochromatosis, as found in a review of the literature, reveals the incompleteness of knowledge of the disease. The evidence is insufficient to establish copper as the cause of hemochromatosis, although it may conceivably cause hepatic cirrhosis under certain conditions. It has been shown that its presence in the body, especially in the liver, is no evidence of it being a factor in the cause of the disease. There is no evidence to show that the excess iron in hemochromatosis is the result of excessive hemolysis or that retained food iron is itself the cause of the disease, since it occurs without the accompanying pathologic characteristics of bronze diabetes. The study of a case of hemochromatosis, together with its iron balance, is recorded, with an evaluation of the results of such studies. Certain aspects of the normal iron metabolism are considered in relation to its possible perversion in hemochromatosis. The view is here supported that hemochromatosis is due to faulty elimination of iron, not to simple retention of food or hemoglobin iron. There is an inborn error of metabolism, expressing itself as a disturbed intracellular circulation of iron, leading to injury and death of the cell and its replacement by fibrous tissue.

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GALLBLADDER DISEASE*

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GALLBLADDER disease as usually seen by the general physician is essentially a chronic disease that has been developing gradually and more or less insidiously for many years. In most cases there have been various vague symptoms of indigestion causing periods of slight abdominal distress with quiescent intervals; in some cases the distress is more constant and less intermittent, but usually with no definite symptoms pointing decidedly to the gallbladder as the cause of the trouble. After a varying period of time these symptoms become much more prominent or perhaps an attack of definite gallbladder pain or even colic will cause the individual to consult his physician. If the attack comes on suddenly and is severe enough the diagnosis is usually made of acute cholecystitis. While acute cholecystitis undoubtedly does occur, most attacks of so-called acute cholecystitis are flare-ups or an acute exacerbation of a trouble that has been going on for some time. Graham says, "Clinical observation suggests that apparently in the great majority of cases a gallbladder that has once become infected remains so. On the other hand there seem to be undoubted cases in which a complete recovery occurs from a single attack of

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acute cholecystitis." I believe that these attacks of acute cholecystitis severe enough to be diagnosed as such are not common; I cannot recall having seen any. All the sudden acute attacks of gallbladder pain that I have seen have had a definite history of indigestion or dyspepsia, or pathological evidence indicating a chronic process that had been going on for a considerable length of time. The only exceptions that come to mind have been a few patients with typhoid fever who developed gallbladder pain.

Etiology.—Gallbladder disease evidently results from several causes; and the causative agencies are carried along different routes. Ascending infection from the duodenum through the ampulla of Vater along the common duct and cystic duct, while formerly believed to be of very common occurrence, is now doubted by some investigators, including Fergusson, who thinks it doubtful if organisms reach the gallbladder through the common duct and cystic duct. Most writers, however, still include this route as one source of infection. The hematogenous route for infection is a double one. Infective organisms may enter the gallbladder wall through the hepatic artery following such diseases as pneumonia, influenza, and septicemia, while typhoid and colon bacilli probably frequently enter by way of the portal vein and are carried through the bile. Deaver says: "The recent work of Rosenow indicated that the infection frequently arrives by way of the blood stream, having previously gained entrance to the circulation through any of the numerous small atria of infection which exist in the upper respiratory tract, or along the course of the alimentary tract from the mouth to the anus. Appendicular disease, tonsillar and sinus infections, and peridental suppuration are presumably the chief portals of entry for this type of infection, the organisms found being most frequently the streptococcus. Earlier writers thought that stasis of the bile was an important if not a chief factor in producing gallstones. Naunym concluded that when stasis of bile occurs, ascending infection follows and that groups of broken down cells added to by deposits of stone-forming material from the bile form the nuclei of stones. Undoubtedly infection is at times carried to the gallbladder from infected lymph glands and from inflammation in adjacent organs, as the liver, pancreas, and appendix, through the lymphatics as well as by direct extension when an inflamed duodenum or colon may be in direct contact with the gallbladder.

Gallbladder disease is most common in adults past middle age, while cases under twenty are uncommon. It increases with each decade past twenty; three women have the disease to one man, and it is more common in women who have borne children than in nulliparæ. Obesity seems to favor the disease and the old saying, "fair, fat, and forty" is very applicable to this trouble. Certain diseases, such as typhoid fever and appendicitis, seem prone to result in the disease. Deaver in a large series found a typhoid history in 5.5 per cent. It is especially common to find it associated with a diseased appendix and in most cases of gallbladder disease if the appendix has not been previously removed it will be found diseased.

Pathology.—In gallbladder disease the pathology varies a great deal, but undoubtedly the disease is located chiefly in the wall of the gallbladder and not in its contents; from this it extends to include the liver, bile ducts, and often the pancreas. The pathologic picture very often does not check up with the clinical picture. As Judd says, "It is impossible to predict during an attack the severity of the underlying lesion for few or very mild symptoms may accompany severe infection, and, on the other hand, an apparently mild infection of the gallbladder may create an alarming clinical picture." The pathological changes may vary from a mild infiltration of the mucosa causing a slight swelling to a gangrenous necrosis of the entire gallbladder. In its mildest forms the gallbladder is not enlarged and the only change present may be a slight thickening of the mucosa with leukocytic infiltration. As the disease progresses, the infiltration extends deeper until it involves all the coats of the gallbladder, its wall becomes thickened, its peritoneal sheen is lost; its color changes to a reddish pink or to a dirty gray and the formation of calculi is usual. From this stage, as the inflammation increases, the gallbladder may become adherent to surrounding organs or tissues, including the stomach, duodenum, large or small intestines, liver, or omentum, and pancreas. Such a gallbladder usually contains stones but the number varies greatly from a single stone to several hundred. To quote from Delafield and Prudden: "If the disease is chronic the wall of the bladder may be thickened and bound to adjacent parts by fibrous tissue; polypoid growths may

occur in the mucosa; the duct may be occluded; dilatation, ulceration, the formation of gallstones, calcification, and atrophy may occur. In inflamed gallbladders the penetration of the fibrous and muscular coats by deep processes of the lining epithelium, Luschka's ducts, may lead to an erroneous diagnosis of carcinoma."

Often a stone will become impacted near the beginning of the duct, or even become adherent there. Such a stone may occlude the duct, allowing no more bile to enter nor any of the contents to be evacuated. When this condition is present the gallbladder may become greatly enlarged and its walls tremendously thickened. If none of its contents can escape, the bile pigment is gradually absorbed and the numerous microorganisms increased, resulting in what is known as an empyema of the gallbladder. The gallbladder becomes very tense due to the great distention, its walls become hard and stiff so that compression is impossible. In such a gallbladder there are frequently areas or patches of black gangrenous mucosa with sloughing of smaller or larger areas present inside, and often many adhesions to surrounding tissues due to localized peritonitis. If the condition continues, perforation may occur at one or more of these gangrenous areas, usually in the distal half. If the gallbladder has previously become adherent to a surrounding viscus the perforation may extend through the adherent walls into that organ; if the perforation occurs into the free peritoneal cavity, peritonitis and death usually results. Perforation into the liver with abscess has been recorded and a very few cases of fistula through the abdominal wall and skin are on record. In some cases the contents of an empyema are absorbed, leaving a small amount of thin whitish fluid, and a small shrunken thin-walled gallbladder may result, especially if the impacting stone completely closes the entrance to the gallbladder so no more bile can enter. Such a condition does not relieve the patient of his symptoms, however.

Gangrene of the entire gallbladder due to occlusion of the cystic artery has been reported.

A rather curious and not thoroughly understood condition is known as cholesterosis of the gallbladder in which infection does not seem to be a factor but rather a disturbance of cholesterin metabolism. Such a gallbladder is commonly known as a "strawberry" gallbladder and more often contains no stones. Judd says: "The many clinical cures reported by removal of a 'strawbery' gallbladder without stones would indicate that perhaps the removal of this one link from the chain of disturbed cholesterin metabolism stops the process and allows the condition to return to normal." A good deal of work on cholesterosis has been done by Aschoff and Baumeister, Judd, MacCarty, Boyd, Gossed, Bertrams, and Loewy. In cholesterosis a lipoid deposit which is an ester of cholesterin is found in masses of epithelial cells in the tips of the villi of the mucosa of the gallbladder; the strawberry gallbladder is the first stage of an aseptic process which can eventually set free concretions of cholesterin in the interior of the gallbladder. A cast off villus that contains cholesterin forms an ideal nucleus for further deposit of cholesterin with the formation ultimately of stone. . . . "The characteristic pathological feature of cholesterosis is a deposit of cholesterin in the subepithelial cells of the mucosa of the gallbladder. On gross examination they appear as small yellowish-green areas resembling strawberry seeds. Other than this the gallbladder may be normal on gross and microscopic examination" (p. 44). In spite of a lack of more definite pathology to be found in the gallbladder, cases with quite typical gallbladder symptoms are cured by cholecystectomy.

Changes in the liver often follow gallbladder disease, varying from fibrous streaking of a thickened capsule to enlargement, cirrhosis, and abscess formation. In Deaver's series the liver was involved in 5.6 per cent of calculus cases and in 3.5 per cent of noncalculus cases. Graham states that an associated hepatitis is present in all cases of cholecystitis with an inflammation around the intrahepatic bile ducts (pericholecystitis). Obstruction may occur if this inflammation is severe enough and causes jaundice. With gallbladder disease the deep lymph nodes are often enlarged and may even become purulent. Pancreatitis to a greater or less extent may be present, the inflammation ascending from the common duct up Wirsung's duct, by direct extension, or by a hematogenous or lymphatic route. Jaundice may or may not be present but usually is not as marked as in carcinoma. It is usually caused by obstruction to the hepatic duct which may be caused by a stone in the common or hepatic ducts, or by inflammation with leukocytic infiltration of the intrahepatic ducts.

Tumors of the gallbladder include fibromata, but they are rare. Adenomata and papillomata are occasionally found. Carcinoma of the gall-

bladder is the most frequent tumor and constitutes from 5 to 6 per cent of all primary carcinomas. Gallstones are present in a great many of these cases, statistics varying from 69 to 100 per cent.

Symptoms.—While the classical symptoms consist of attacks of severe pain in the right upper quadrant of the abdomen, extending through to the back and right scapula region, recurring at irregular periods without apparent cause, lasting from a few hours to several days, of such great intensity that a physician must be called and morphine given, if one waits for this picture he will miss at least half of the cases. Biliary colic is usually a comparatively late symptom that follows a long period of indigestion. The earlier symptoms as given by most patients are those of indigestion that has been present to a greater or less degree for many years. In most cases this has been more or less constant but always there is a history of frequent periods during which it was much worse. Particularly do these symptoms of distress follow over-eating. Over-eating seems a more frequent factor than eating a particular article of food, though as a rule certain articles such as apples, cabbage, tomatoes, and pork have to be restricted or eliminated. Distress in the epigastrium coming on very soon after eating; regurgitation, sour stomach, gas formation, belching, a feeling of distention and pressure, a heavy full feeling are the most common earlier symptoms; nausea and vomiting are apt to occur at intervals and bilious attacks come frequently. Some patients describe their symptoms as a burning or gnawing sensation. As the case progresses distress becomes more constant, the severe attacks more common, and more care and attention must be given to diet and the avoidance of over-eating. The patient is likely to be more inconvenienced during the evening and night; any person who occasionally or frequently is awakened from his sleep by upper abdominal pain or distress, especially after midnight, should always be regarded as likely to have gallbladder disease. In most cases there is no fever; however, some individuals have a definite chill, or chilly sensations, and fever may be present up to 102. Leukocytosis from 12,000 to 18,000 is common. Pain in the severer attacks frequently extends into the lower right chest, and sometimes causes impairment of breathing on this side. The pain sometimes extends to or is located in the center of the epigastrium, and in a few cases is chiefly to the left of the center, under the left ribs. It is not at all uncommon for the pain to extend from under the right ribs straight through to the back or up the back to the scapula. Pain in the shoulder is uncommon. As the disease progresses and becomes more chronic the patient usually has at times attacks of pain that are more severe and last longer; mild jaundice may or may not appear but usually is not severe.

Differential Diagnosis.—The main diseases to be differentiated are coronary disease, pneumonia, pleurisy, appendicitis, pancreatitis, stomach ulcer, intestinal obstruction, kidney stone, infections of the upper urinary tract, and malignant diseases of the stomach, intestines, and gallbladder tract. Before any abdominal diagnosis can be made, inflammatory disease of the chest cavity must be ruled out. All too frequently pneumonia with its pleuritis pain has been diagnosed as an acute abdominal condition and the patient subjected to an operation; very frequently the pain of pneumonic disease is located in the upper abdomen in exactly the same place that a gallbladder pain is commonly found, and with it definite abdominal rigidity and tenderness, chill, vomiting, and a serious general appearance. In gallbladder disease there is almost always a history of previous trouble in the upper abdomen, absence of all lung signs except possibly restricted breathing on the right side, and entire absence of any throat symptoms. If in doubt an x-ray film of the chest will almost always show whether pneumonia or pleurisy is or is not present.

Appendicitis is so often associated with gallbladder disease that it is often impossible to be certain which condition is causing the more trouble; not infrequently an appendix pain will start higher than usual and make one suspicious of an attack of gallbladder trouble; but if the attack is severe it usually is definitely diagnosed in a short time by the pain and tenderness shifting lower in the abdomen. In a very few cases a gallbladder pain has started over McBurney's point, stayed there, and at operation a normal looking appendix found with gallstones present in the gallbladder. Very frequently both diseases are causing the trouble and in these the diagnosis is generally fairly easy.

Peptic ulcer, either of the stomach or duodenum, not infrequently simulates gallbladder disease and sometimes the diagnosis is not made until operation. Occasionally both conditions are

present in the same patient at the same time. A careful history should usually give one a fairly good idea as to which condition is present. In ulcer, relief is generally experienced by eating light food or drinking milk, as well as by alkaline treatment. In gallbladder disease on the contrary, food usually causes distress and the relief from soda may or may not be present. In ulcer, the distress is greater after the period of digestion is over, two and a half to three hours after eating, while that from gallbladder comes very quickly after a meal, usually in ten minutes to half an hour. If night pains come, those from ulcer are apt to be before midnight while the gallbladder night pain is after midnight in the majority of cases. The x-ray will usually give very definite information regarding either or both, and in doubtful cases may be the deciding factor.

Intestinal obstruction is not so often confused with this disease as the pains in obstruction are more crampy and colicky and intermittent in character. In the majority of cases of obstruction the pain is located lower down in the abdomen and more often nearer the midline. Wangensteen's sign is present if looked for carefully, and a flat x-ray film will usually give definite signs.

Kidney stone is often confusing, especially if the x-ray shows what looks like a stone in the right loin or side. A stone on a flat film is far more likely to be a kidney stone, and a ureteral catheter will usually clear this point. Pus or blood in the urine should make one suspicious of a kidney condition also. Another point, brought out particularly by DeQuervan, is the location of muscular rigidity. In a kidney condition the muscular rigidity if present is in the loin or back behind the kidney a short way below the rib; in a gallbladder pain the rigidity is just below the ribs in the front or in the epigastrium. The history is important here also.

Malignant disease is usually slow in developing, with a history of a few months rather than years. Loss of weight as well as cachexia should be viewed with suspicion. Jaundice that is unusually severe and that continues for weeks is apt to be malignant, as gallbladder jaundice usually is comparatively slight and transient.

Coronary disease can usually be diagnosed definitely by an electrocardiogram. With the growing incidence of this trouble it should always be considered in making a diagnosis.

To recapitulate, the earlier symptoms are commonly those of indigestion or dyspepsia characterized by gas, belching and distention, coming on shortly after eating and more commonly in the evening; sour stomach, heartburn, and eructations are common. Relief from soda is occasionally described but eating aggravates rather than relieves the distress. When these symptoms of dyspepsia continue over a period of time and then are followed by occasional attacks of radiating epigastric pain or by pain of a less severe character but with some jaundice and septic symptoms, when there is a low gastric acidity and a negative gastric roentgenogram, one should always be suspicious of gallbladder disease; if to this is added tenderness below the right ribs and absence of shadow in a cholecystogram after taking the dye the diagnosis should be fairly certain. Attacks of typical biliary colic with pain so severe as to require morphine can usually be diagnosed at once.

Cholecystograms are a great aid in diagnosis; while not positively diagnostic in most cases they add a great deal of information and help complete the picture. Absence of a gallbladder shadow on the fourteen and sixteen hour films after the administration of the sodium tetraiodophenolphthalein dye is the most definite and reliable sign given. A faint shadow is of scant value and gives but little information. Most authorities claim that absence of shadow when the dye is given is positive in 95 per cent of cases as checked by operations. The presence of shadow is of much less value, as 15 to 20 per cent of these cases will show stones at operation. Stones are shown on the x-ray films in about 15 per cent without the dye and in about 40 per cent when the dye is used. Graham and his associate at Barnes Hospital in St. Louis prefer the intravenous method of administration of the dye. They inject normal saline solution into the vein and while the saline is running in they inject the dye through the rubber tube with a hypodermic needle. Graham claims greater accuracy and a higher percentage of correct diagnosis, though he admits that there is a certain amount of danger and that deaths have followed. Most men now are administering the dye by mouth and find this method very satisfactory.

Gallstones give essentially the same symptoms as cholecystitis without stone; but usually in cases with calculi the symptoms are more marked

and more severe, the attacks sharper, more sudden in onset as well as in relief.

When jaundice is present one must think seriously of common duct stones or of obstruction in the common duct. Jaundice may be caused by liver damage due to blocking of the intrahepatic ducts as well as by carcinoma. The serum bilirubin test is especially valuable in determining the severity of the jaundice, and is of particular value in ascertaining whether it is increasing or diminishing. A mild jaundice that tends to lessen in severity in a week or two and in which the serum bilirubin is diminishing, especially if it came on with or following an attack of pain in the gallbladder region, is usually due to gallstones in the common duct; particularly is this true if the case history indicates previous attacks of gallbladder trouble. A jaundice due to cancer does not usually clear up but rather tends to increase without remissions.

Complications. Probably the most common of gallbladder disease results from it as a focus of infection. Lumbago, sciatica, arthritis, irritable heart, are the most common sequelæ and have been frequently cured by cholecystectomy; naturally indigestion and dyspepsia and constipation are quite commonly relieved by operation. Just what the connection is between cholecystitis and appendicitis is not definitely known; it may simply be that both have the same cause; but certain it is that a great many cases of chronic gallbladder disease are associated with a diseased appendix—so many that it seems more than accidental.

Treatment. In the early stages of gallbladder disease, if the infection is not too severe, medical and hygienic treatment may be of some value. Diet is of value, and, of even greater importance, general hygiene and exercise, posture, and the abolishing of constricting clothing. Magnesium sulphate administered by the duodenal tube as advocated by Lyons may be of help in draining the gallbladder. It is also of some help given by mouth for its cathartic action.

Except in these early cases, the treatment is strictly surgical, and experience is showing that in chronic cases with definite symptoms, especially when the distress is increasing or if definite attacks of pain are present at frequent intervals, surgery not only gives the only permanent relief but is advisable in order to prevent serious complications at a later date. When we consider the numerous instances of tremendously distended gallbladders with inflammatory adhesions covering the entire wall of the gallbladder, of marked adenitis, and secondarily diseased liver and pancreas, of adhesions and rupture into other organs as well as the occasional rupture into the free peritoneal cavity, we must think seriously before advising procrastination. Added to this is the fact that nearly all cancers of the gallbladder are accompanied by stones. While the results following cholecystectomy are not perfect, the percentage runs about 85 per cent for entire relief of all symptoms where stone was present, and 75 per cent for noncalculus cases. Undoubtedly in some of the noncalculus cases the diagnosis may have been wrong.

As to when to operate there is some dispute. A great many authorities advise waiting until an acute attack of pain has subsided. Were one able to ascertain definitely which cases will subside and which will go on to rupture, the question would be simple. But so often the symptoms of a very greatly distended gallbladder with definite gangrenous areas are no more severe than the ordinary biliary colic so that a differentiation cannot always be made. To allow a gangrenous gallbladder to wait is dangerous, and until diagnostic methods are discovered which will indicate the severity of the case far better than any we now know it seems better and safer to operate if the symptoms in these severe cases persist more than two or three days without definite easing. Probably in some of these very severe cases cholecystostomy may be safer; but in the majority cholecystectomy can be done.

There is a tendency to overlook some cases of gallbladder disease in the earlier stages; in quite a number the diagnosis is missed for many years until finally a rather severe attack of pain or distress makes the diagnosis self evident. Even then many patients are not advised to have an operation. In view of the very serious results that so often follow repeated attacks over a period of years, the mass of inflammatory adhesions and exudate that forms, the damage caused to the liver, pancreas, and general system, it would seem far better treatment to have the gallbladder removed early before this serious picture develops. When one considers the special complications that occasionally follow, such as perforation, localized or general peritonitis, and the possibility of a malignant condition developing, any one advising medical treatment or a prolonged waiting period must in justice to his

patient have a very definite and valid reason for so doing.

My series during the past ten years is eighty cases; in fifteen of these there was an empyema of the gallbladder, in most of which there was marked distension. Five patients had definite gangrenous areas in the wall of the gallbladder; in two the gallbladder was adherent to the transverse colon and had perforated and was draining into the colon. There were five deaths, two being caused by pneumonia, one by an uncontrollable hiccough, one by a duodenal fistula resulting from the breaking up of adhesions in a very old woman, and one from shock. In all cases a cholecystectomy was done, except in one, and in that one a cholecystectomy followed the cholecystostomy ten days later. In all cases of gangrene, and in most of those with empyemas, a cholecystectomy was done early, within the first three or four days; most of these patients were very sick, but all recovered, and convalescence was surprisingly smooth. Seventy-two per cent had calculi, including one carcinoma of the gallbladder; thirteen were men and sixty-seven women. Ages ranged from sixteen to eighty-four. Two girls, one sixteen and the other seventeen, both had calculi present. Twenty-four of these patients had had a cholecystogram; of this number twelve (50 per cent) showed no shadow, six (25 per cent) a poor shadow, four (16.6 per cent) a good shadow, and two (9 per cent) showed stones. We have been able to follow sixty-five of our series and fifty-six are practically symptom-free, seven are fair, and two are not improved. In forty-three cases we removed the appendix at the time the gallbladder was removed, and in ten cases it had been previously removed. One patient had had a cholecystostomy twenty years before, and later, some six years prior to our operation, a fistula had formed which drained bile through the skin and which was still patulous at the time we operated. Since we removed the gallbladder in July, 1931, she has been well. Two patients had pelvic adhesions and each had a diseased tube removed in addition to the gallbladder.

The two in which the gallbladder was draining into the colon were each having attacks of pain. One of these was especially interesting as the rupture into the colon occurred while in the hospital. She was admitted in July during my absence. She was having very severe pain with vomiting, and she had a large mass under the ribs, more to the right than in the middle. She was a very sick woman and supportive treatment was used preparatory to operation. On the third day the pain eased up very materially and the next day the tumor was considerably smaller and less tender. She refused operation and went home. Her next attack of pain was after a heavy dinner on Thanksgiving Day; the following day she came back for the operation. The diagnosis in July had been a stone impacted in the cystic duct which was thought to have become loosened, allowing the distended gallbladder to drain.

Nearly all of our cases have been drained. We now follow Graham's plan of making a stab wound to the right of the incision and introducing a Penrose drain through this opening which is carried to the stump of the cystic duct. It is usually removed in forty-eight hours and we find this quite satisfactory.

QUACKERY AND PHYSICAL THERAPY

A quack is generally defined as a person who makes claims for skill that he does not possess, especially medical skill. The quack in the field of physical therapy, as is pointed out by Dr. C. B. Heald, is more likely to make the claims for the machines than for his particular ability in operating the machines. In his consideration of this subject, Dr. Heald has set down certain limitations to determine who are qualified to practice physical therapy either as physicians or as lay technicians. He recognizes that no lay technician should use such devices on the sick without medical prescription and without repeated supervision of the patient by the physician. The responsibility for the care of the patient is not that of the technician but that of the doctor whom the patient consults. Heald feels that all physical therapeutic measures in the hospital should be under the control of one department, not with light treatment in the department of dermatology, massage in the department of orthopedic surgery, and the electrical devices for stimulating nerves and muscles in the department of nervous and mental disease or in the radiologic department. The American medical profession has its own Council on Physical Therapy, which already has contributed largely to the control of charlatanism in this field and which, as it gains momentum, will probably do even more effective work in this direction. (Jour. A. M. A., November 5, 1932, p. 1606.)

ACUTE CONDITIONS OF THE GALLBLADDER*

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ACUTE conditions of the gallbladder are perhaps the most important upper abdominal lesions in surgery. The chief etiological factors attributed to these conditions are: (1) disturbed metabolism of cholesterol and its solvents; (2) infection; and (3) obstruction of the bile ducts.

A differential diagnosis of gallbladder disease is frequently difficult because of the close proximity of the gallbladder to the liver, duodenum, colon, pylorus, right kidney, pancreas, and diaphragm. An early and definite diagnosis is important because of the satisfactory and permanent good results obtained from timely operation. An accurate and comprehensive history and physical examination are very necessary in arriving at a definite differential diagnosis.

A typical case of gallbladder disease usually gives little difficulty in arriving at an accurate diagnosis, but an atypical case may simulate many other conditions. In these cases some factors are very important and quite constant in the history and observation of the patient. Everything at our command is sometimes necessary to determine not only that the gallbladder is the organ affected but also just what stage of the disease is present.

In the history, pregnancy, typhoid fever, attacks of colic without jaundice, and attacks of mild diabetes are sometimes important.

In gallbladder disease, if there is a history of previous attacks, the intervals are usually quite irregular and digestive disturbances are usually present. The digestive disturbances are manifested by distress soon after the ingestion of food. The patient will call attention to certain types of food that cause distress. This distress is accompanied by bloating and belching. When there is pain, it comes on suddenly, is located at the right costal margin and is transmitted through to the scapula. The pain usually ends abruptly but may continue unabated except when relieved by narcotics.

The pain may be relieved by vomiting but not so frequently as in the case of gastric or duodenal ulcer. The vomitus is usually bile-stained, in contrast to the blood-stained vomitus of ulcer. The gallbladder attack gives a sense of fullness. The patient frequently speaks of having a sensation of the presence of a lump in the epigastrium. The distressing sensation in the case of ulcer is usually of a gnawing or burning character. In gallbladder disease the patient frequently belches volumes of gas, while with ulcer sour eructations are more common.

Acute pancreatitis may be confused with acute conditions of the gallbladder, but in the real acute hemorrhagic pancreatitis the pain is more severe and very early the symptoms of prostration and toxicity are more marked. Here the pain radiates through to the lower dorsal or upper lumbar areas.

Right-sided renal infection, especially pyonephrosis, may simulate empyema or other acute infections of the gallbladder. The urinary contents and palpation may aid in ruling out this condition. Right subphrenic abscess may be confused with acute gallbladder conditions. In the latter, a history of some antecedent infection will frequently give us a clue to the diagnosis.

Acute gallbladder disease has been confused with pneumonia, pleurisy, catarrhal or infectious jaundice, acute yellow atrophy, cirrhosis, syphilitic hepatitis, herpes zoster, Pott's disease of the spine, and coronary thrombosis.

The type of infection in the gallbladder has been a matter of much difference of opinion. Rosenow and Brown consider streptococci to be the chief etiological factor, with the colon bacillus a secondary infection. Williams and McLachlan hold to practically the opposite opinion. They give the colon bacillus as the most frequent offender, with streptococci as a secondary infection.

Mann produced acute cholecystitis and destruction of the gallbladder wall with intravenous injection of chemical solutions. In many acute conditions, and even with gangrene present, no bacteria have been found.

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Osler classified the various types of acute cholecystitis as catarrhal, suppurative, phlegmonous, gangrenous, and membranous.

The ordinary acute cholecystitis may pass through several or all of these various stages. Our great problem is to decide just what stage of the condition is present before the abdomen is opened. The great mass of literature on gallbladder disease applies only in slight degree to acute conditions.

The patient with an acute condition does not so often reach the great surgical centers from which much of our statistics is obtained.

Deaver reported only two acute cases in a series of 328 gallbladder operations.

The Boston City Hospital, over a period of six years, reported only 226 acute conditions of the gallbladder. And of 1,000 cases of operative gallbladder conditions at Johns Hopkins, only 234 were acute.

Baumgarten, of the Mayo Clinic, studied 4,575 gallbladders removed surgically. Sixty of these gave evidence of a gangrenous condition.

Gibbon, in 1902, remarked that gangrenous cholecystitis was sufficiently rare that every individual case should be reported.

Vest recently collected seventy-one cases from the literature and discussed the condition at length. He reported a case in a boy ten years old. Czerny says a solitary stone wedged in the cystic duct may produce pressure on the cystic artery and cause gangrene.

The cystic artery is practically an end artery. A rapid cutting-off of the blood supply may produce gangrene early, but a slower process may produce an empyema followed by gangrene.

Opinions differ widely as to the treatment of acute conditions of the gallbladder. If we could rely on the acute condition subsiding, no doubt the interval operation would be more safe. In a large series of cases, however, we would find that it frequently does not subside but progresses to a point where operation becomes hazardous.

We attempt to follow the following procedure: If the general symptoms subside after the first pain is relieved or during the ensuing twenty-four or forty-eight hours, operation is delayed. But if the severe pain and general symptoms persist after forty-eight or seventy-two hours and the patient is relieved only by narcotics, the pain returning as soon as the effect of these has worn off, then operation is seriously considered. If the leukocyte count is high, and a mass can be definitely palpated at the right costal margin, and all symptoms tend to advance rather than recede, we believe operation is imperative unless there is some definite contraindication. These latter cases usually mean that the cystic duct is blocked.

In empyema of the gallbladder, Dennis first called attention to the fact that it is usually the distal end of the cystic duct or the pelvis of the gallbladder that is obstructed.

Halstad called attention to the fact that in these cases the gallbladder can usually be palpated at the liver margin.

Passing from the gallbladder to the common duct, the distance between the cystic duct and artery gradually increases. Therefore, a stone in the pelvis of the gallbladder or distal end of the cystic duct is more likely to produce pressure on the cystic artery than one close to the common duct. Here the obstructing body shuts off the circulation of the gallbladder and also blocks the exit of its contents.

Ravdin showed that the damaged gallbladder absorbs water slowly. If the damage is severe and the cystic duct is obstructed, fluid is taken up through the gallbladder wall, thus adding to its contents and producing hydrops or empyema. Chemical substances normally in the blood enter the gallbladder with this fluid. Stasis, tension, and impaired circulation pave the way for either bacterial or chemical destruction.

Ravdin has also shown that the normal gallbladder removes certain substances from the bile and returns them to the body fluids, but that the damaged gallbladder shows a tendency to a reversal of this function. This chemical substance retained in the gallbladder may aid in the process of disease.

The basis of this paper is a report of sixteen cases with complete blocking of the cystic duct. In all of them an acute empyema was present, with varying stages of gangrene existing in seven of the sixteen cases.

Ten of the sixteen patients were operated upon within seventy-two hours from the time of onset of the attack. In all these a cholecystectomy was done.

The eleventh patient showed a more mild and more gradual onset. This patient was operated on the fifth day and a cholecystectomy was done.

The twelfth patient was operated upon within

seventy-two hours, but the gallbladder had perforated and a general peritonitis was present.

The thirteenth patient was operated on the fifth day but the extensive inflammation and necrosis of the gallbladder made cholecystectomy impossible.

The fourteenth patient—a very poor risk—was not operated upon until the sixth day. The gallbladder had perforated and the patient expired as soon as the abdomen was opened.

The fifteenth patient was operated upon elsewhere, several days after the onset of the attack, and a cholecystotomy was done.

The sixteenth patient died of a coronary thrombosis on the third day after the onset of the attack. We were still pondering on the advisability of operating.

I will give a brief history of some of these cases. The first ten had much the same history, findings, and ultimate results and I shall mention the details of only a few of these.

Case 1.—Mrs. O. L., aged twenty-eight, had the first attack of epigastric pain eleven years before the operation, similar attacks six years later, and a third attack one year before operation. In the final attack the pain was severe at the right costal margin, radiating through to the scapula. Nausea and vomiting were present. Morphin by hypodermic gave relief for twelve hours, but then had to be repeated. On the second day a pear-shaped mass could be palpated at the right costal margin. The abdomen became more distended and the general symptoms increased. On the third day the temperature rose to 102°, pulse 110, and leukocyte count 16,000. There were a few casts and some albumin in the urine.

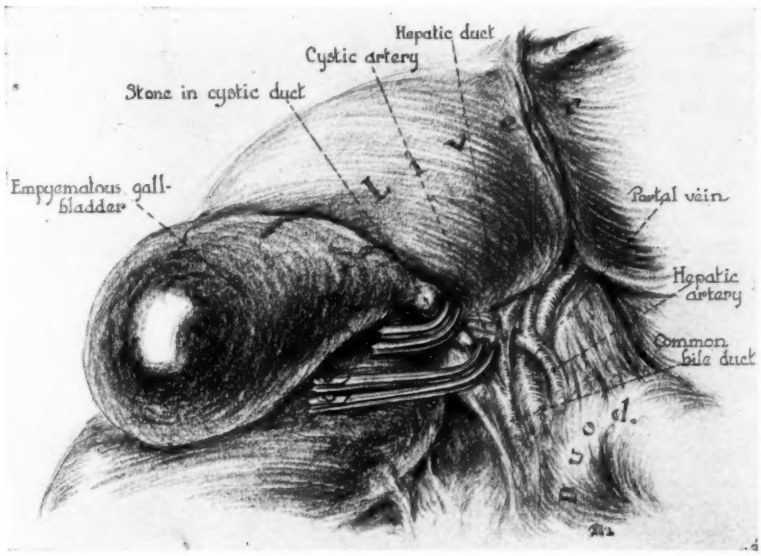

Fig. 1. Drawing of the condition in Case 3. This shows the stone in the distal cystic duct pressing on the cystic artery. The portion of the cystic duct between the clamps appears about normal. The inflammatory process here is confined almost entirely to the gallbladder. It has not yet become adherent to adjacent organs.

At this time a high right rectus incision was made under local and ethylene anesthesia. The gallbladder was about three times its normal size and so tense and necrotic that it could not be retracted except by traction on the cystic duct. The obstructing stone was in the pelvis of the gallbladder and apparently most of the inflammatory process was confined to the gallbladder. The proximal end of the cystic duct appeared about normal. The cystic duct was doubly ligated close to the common duct with chromic catgut. The duct was severed between clamps and both cut ends treated with iodine. The gallbladder was then easily peeled from its bed with the gloved finger. A small penrose drain was inserted and the wound closed. The patient had a very mild and smooth convalescence. She left the hospital on the tenth postoperative day and has been well since.

Case 2.—Mr. C., aged forty-four, gave no history of previous gallbladder colic. Two days before operation he was seized with a sudden, severe pain at the right costal margin at 2 a. m. One-fourth grain of morphin relieved the pain for three or four hours, when it had to be repeated. The patient vomited all that day and complained of pain as soon as the effects of the morphin wore off. On the second day the abdomen

became distended and rigid, the rigidity being more marked over the right rectus muscle. On account of the extreme rigidity, we could not be sure of palpating the gallbladder. The leukocyte count was 22,000; temperature 100.2°.

At this time the abdomen was opened under spinal anesthesia. Again the inflammatory process seemed mostly confined to the gallbladder. The gallbladder was tense, necrotic and full of pus and stones. The gallbladder was removed, as in the previous case. The temperature returned to normal on the third postoperative day and all symptoms subsided. The patient was discharged from the hospital on the eleventh day and has been well since.

Case 3.—Mrs. K. S., aged forty seven, had had three previous attacks of gallstone colic, the last of the three having been six months before the final attack. Three days before operation the patient was awakened in the night with a severe attack of pain at the right costal margin. The pain continued for ten minutes, then let up for fifteen minutes. A hypodermic of morphin relieved the patient for three or four hours, then had to be repeated. On the second day a large mass could be felt at the right costal margin extending as far back as the right kidney area. We had difficulty in ruling out a kidney tumor and on this account the patient hesitated about undergoing operation.

On the third day the temperature was 99°, pulse 100, and leukocyte count 22,000. At this time the abdomen was opened under spinal anesthesia and a large, distended and necrotic gallbladder was revealed. The gallbladder was well packed off from the peritoneal cavity and removed, as in the former case. A small drain was inserted and the patient made a good recovery, was discharged from the hospital on the tenth day, and has been well since.

Case 4.—Mrs. J. K. L., aged fifty-three, had had her first attack of epigastric pain three weeks before operation. The pain was never severe enough to require morphin for relief. The patient continued to have epigastric distress and her symptoms remained about the same for two and one-half weeks, when suddenly the temperature rose to 103°, and the leukocyte count to 12,000.

The patient was taken to the hospital but her symptoms soon began to subside. Two days later her temperature reached normal and she was much better generally but could not eat and still complained of a lump in the epigastrium. A large mass could be palpated at the right costal margin. On opening the abdomen the gallbladder was found to be buried by a mass of adhesions and was exposed with much difficulty. This was the only case in the series in which a stone was not the obstructing body. Here the inflammatory process and torsion of the cystic duct caused the obstruction. The gallbladder was full of pus but no stones were found. A cholecystectomy was done. The patient made a good recovery and has been well since.

Case 5.—Mrs. J. D., aged forty-nine, had had her first attack of gallstone colic ten years before operation. She had had three more similar attacks previous to her final attack. All of the other attacks subsided after short periods of pain and epigastric distress. In this final attack the pain and general symptoms gradually increased until the fifth day following the onset of the attack, when she came in for operation.

The abdomen was opened under spinal anesthesia. The gallbladder was covered by omentum and adherent to adjacent organs, and when separation of these was begun it was found to have perforated. Great care was taken to prevent contamination of the peritoneal cavity. The gallbladder was gangrenous and filled with pus and stones. The obstructing stone was in the pelvis of the gallbladder. Stones, pus, and portions of the necrotic gallbladder were wiped away and several drains were inserted. The patient made a fairly good recovery but drainage continued for about three months. At the end of that time the wound closed but had to be reopened two months later because of epigastric pain. Subsequently the wound was opened three times for the relief of pain, but has been closed now for six months.

Case 6.—Mr. A. H., aged forty-seven, had had no attacks of gallstone colic previous to the attack in which he was operated. Three days before the operation he was seized with sudden severe pain at the right costal margin. It required ¾ grain of morphin to relieve the pain. Morphin had to be repeated every two or three hours to make the pain bearable. On the third day the pain suddenly let up and the patient was quite comfortable for several hours. Soon the abdomen became distended and tympanitic. All the symptoms of a diffuse peritonitis were present. The patient appeared to be in shock; the pulse increased; there was a slight jaundice present; and attempts to evacuate the bowels were in vain. His temperature at this time was 100°, pulse 106, leukocyte count 22,000. It was at this time he was referred for operation.

Under spinal anesthesia the abdomen was opened. Bile stain was observed before the peritoneum was opened. The gallbladder had perforated and pus, bile and stones had been evacuated into the peritoneal cavity. The abdominal cavity was cleaned out as well as possible, a catheter inserted through the perforation of the gallbladder, several cigarette drains were placed outside the gallbladder, and the abdomen closed. The patient had a very stormy recovery and drained for several months, but is well today.

Case 7.—Mrs. B., aged seventy-seven, was operated upon elsewhere. Her attack of pain came on three weeks before the operation. The condition did not entirely clear up during this time and the patient was desperately sick at the time of operation. A cholecystotomy was done and the patient left the hospital in fair condition after three weeks but the wound drained for two months. Two or three weeks later the wound had to be reopened on account of severe pain. After draining several weeks, it closed again. In all, it had to be reopened nine times before it finally closed to remain closed. This was seven months after the date of operation.

Case 8.—Mrs. Mc., aged sixty-two, had never had a severe attack of gallstone colic before but did have digestive disturbances indicative of gallbladder disease. This severe attack came on three days before the end.

During the first few hours of the pain the patient had ¼ grain of morphin for relief of the pain. Soon the effects of this wore off and morphin had to be repeated. The severe pain was quite definitely located at the right costal margin and a definite mass could be palpated at this point. She also complained of a pain over the precordium. This somewhat confused the picture.

The patient was brought to the hospital for study. She had considerable morphin and vomited almost continuously and was so extremely sick that detailed study was difficult. On the third day of the attack we were just about ready to do an electrocardiogram when suddenly the patient collapsed and expired. The patient had come to the hospital twenty-four hours before the end, but fortunately operation was delayed. This patient had definite empyema of the gallbladder as well as an acute coronary thrombosis. Her temperature was 99.6°, pulse 106, and leukocyte count 20,000 on admittance to the hospital.

Case 9.—Mrs. P., aged sixty-eight, had had her first attack of gallstone colic eight years previous to the final attack. The attacks had been frequent since, with interval food distress and other symptoms of cholecystitis. We had considered operation several times before but the general condition of the patient was not good and she had definitely made up her mind that she would die if operated. This mental attitude of the patient was one of the principal factors for our delaying operation. During the final attack she was in the hospital several days. We were observing her, hoping the condition would subside.

On about the sixth day after the onset of the attack she suddenly showed signs of collapse and was taken to the operating room as soon as possible after the administration of hypodermic and intravenous stimulants. Her pulse was fairly good and after receiving the stimulants she seemed to be in fair condition for surgical drainage. The abdomen was injected with novocain and just as the abdomen was opened the patient expired. The gallbladder had ruptured and some of the contents had been evacuated into the peritoneal cavity.

I have given a brief history of only nine of the sixteen patients. The symptoms, surgical procedure, and ultimate results in the remaining seven were very similar to those of the first four above. All sixteen patients gave definite evidence of empyema of the gallbladder. In seven of these, gangrene was present to some degree. All but one had stones in the distal cystic duct or pelvis of the gallbladder, and had a leukocyte count above 12,000, many having been above 20,000. All had sustained pain and practically all had steadily increasing symptoms from the onset of the attack. Ten patients operated upon during the first three days of the attack showed the inflammatory process apparently confined to the gallbladder. In all of these ten patients the gallbladder was quite readily removed and contamination apparently avoided. All of these ten had a mild convalescence. All ten were discharged from the hospital in less than two weeks and none had drainage after that time.

In the remaining patients operated upon the inflammatory condition had spread into the neighboring tissues. Extensive adhesions had taken place and cholecystectomy was made very difficult or impossible. The morbidity and mortality was definitely increased in the delayed cases.

In a severe acute abdomen of this class it is not always easy to determine before exploration just what stage of gallbladder disease is present. If a definite diagnosis can be made in these cases, I believe that the earlier operation is resorted to the better and more permanent will be the result.

DISILLUSIONMENTS IN NASAL SURGERY*

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NOWHERE in the entire field of surgery, I believe, has poor practice been indulged more than in the nose.

For the pioneers in rhinology I have most profound respect and admiration. Like the frontiersmen of civilization, they blazed the trail for us who came after them. Into and through a new and unknown territory they led us by their courage and zeal to our present-day knowledge and understanding, absorbing the shocks of new experiences and bearing the burden of responsibility for new and untried procedures as they pressed forward and on.

Modern rhinology, quite similarly to modern otology, gained added impetus largely through the brilliant work of one man, Zukerkandl, famous anatomist of Vienna, who gave the world such understanding of the accessory nasal sinuses

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as it never had before, and upon which Hijek builded, probably as much or more than others, modern clinical rhinology. Politzer, in his field, it has always seemed to me, almost singly and alone, created the science of modern otology, developing not only our present knowledge of its histology and physiology but its pathology and treatment as well.

As in all great human undertakings, pioneer projects have taken a tremendous toll in waste of resources; so, too, early rhinologic practice, in its rapid growth and spread, has left in its path what would appear in retrospect like little more than a trail of surgical vandalism. Prior, even, to the universal assault upon the nasal accessory sinuses, surgical activity in the nose by the early rhinologists included much that was unfortunate through reckless sacrifice of indispensable mucous surfaces, but nowhere reached its peak of misfortune until radical surgery upon the sinuses added tremendously to the increasing multitude of climatic invalids that were left in its wake. Like a challenge to the wisdom of the Creator, and unappreciative of the imperative and indispensable function of the nasal structures, turbinates were clipped clean, as if they were newly discovered foreign bodies, and septal spurs and irregularities, with all their irretrievable mucous tissues, were sheared off, leaving the subject incapable of self-adjustment and self-defense against the vicissitudes of atmospheric and climatic change. Without exaggeration I think we can say that many well-to-do patients of that time prolonged their lives only by going to warm climates during the winter, while those unable to do so in many instances had shortened lives as the result of consequent seasonal and climatic invalidism.

Proper appreciation of the importance of the function of the nose can best be kept in our minds by picturing the composite nasal structure as a heated vestibule, with thermostatic control, guarding the deeper respiratory tract, tempering, moistening and cleaning the inspired air that we breathe. The turbinates can be compared to the coils of a radiator in this vestibule, through which the air in passing is heated and from the moist surfaces of which the air is moistened and cleaned. In addition, the vascular tissue of the turbinates, capable of rapid engorgement and depletion, readily adjusts itself to meet the changing requirements of thermic fluctuation in our environment. To a lesser degree, also, the composite structure of the nasal cavities is capable, through evaporation, of cooling inspired air that may be too warm. Nowhere else in the body, unless it be in the lungs, is there such an extent of surface area afforded in such a small space as in the nose and its accessory cavities. All this area is unquestionably provided in the animal economy for the purpose of multiplying the extent of mucous membrane, with its glandular secreting mechanism and its vascular, heat-radiating surfaces.

In considering the affections that form the greater part of nasal troubles in people of this geographic section or corresponding climate, I feel strongly that the one condition responsible more than all others is the unnatural atmospheric condition in which we live, resulting from our modern housing and heating arrangements. Living in an alternating temperature of seventy degrees or above indoors, and zero or below outdoors, as we do by going in and out many times a day, was never intended by Nature as an added task for the nasal thermic mechanism, marvelously capable though it be.

In its heroic attempt at readjustment, to keep pace with such violent fluctuation, alternating in engorgement and depletion, the vascular tissue of the nasal mucous membrane soon takes on the defensive change of hypertrophy. Hypertrophy, as we know, includes a fibrous infiltration which soon makes such tissue incapable of its normal function of shrinkage, and, as a result, obstructed noses soon lead to air-tight, unventilated and undrained accessory sinuses. Air-tight sinuses soon bring on negative pressure, and the tissue fluids seeping into them become an ideal culture medium for the usual inert bacteria of ordinary, inspired air. Suppuration of the cavity is the result and is unrelieved until ventilation and drainage are somehow provided.

Now we come to the treatment, and here is the pit into which many enthusiastic, well-meaning but poorly balanced rhinologists fall. They have forgotten one of the fundamental truths of pathology, and that is that hypertrophy and atrophy are one and the same process, of which hypertrophy is the first half and atrophy the last half. They forget, when looking at an over-roomy, atrophic nose, even though it has never been touched surgically, that at one time this same nose was an hypertrophic nose, crowded and ob-

structed until fateful, supervening atrophy came along.

Two additional elements further contributing to atrophy are also forgotten. First, tissues of specialized function are exceptionally vulnerable to traumatism and, second, the scar tissue following surgical procedures, added to the already present fibrous infiltration of hypertrophy, very much hastens and extends the degree of atrophy.

Cauterization by actual cautery is even more injurious than sharp dissection, and the atrophy following it is more far-reaching.

As a result of these inescapable processes, the enthusiastic operator finds only too soon that the roominess that he provided by his surgery has not only doubled but trebled in a comparatively short time. After it has gone its full limit, it may be many times what he originally intended.

This is the story, only too evident, that is told to us by looking into the noses of patients of the early rhinologists and, too, the patients of present-day operators who are too radical in their surgery.

If the above portrayal is what is to be seen in noses where surgery was confined to the turbinates, you can imagine the graveyard appearance of noses where, in addition, the ethmoids have been torn down and other sinuses laid open. Let us be thankful that the above, for the most part, is the picture of the past. While, happily, such extreme cases are seldom longer seen, yet to a lesser degree they are much too often still in evidence.

In hypertrophic noses just one-third of what appears mechanically necessary will prove sufficient as an end-result, and it is far safer to underdo surgical resection, with a subsequent small additional resection, than to lose something which is entirely irretrievable.

Operation upon the sinuses proper is, in my opinion and experience, tremendously overdone. In the large majority of cases topical treatment and minor adjustments of the structures in the nose proper will procure ventilation and drainage; and, after all, the normal amount of ventilation and drainage is the cardinal requirement of health for all sinuses.

Ventilation in excess of the normal is to be avoided. Too-open and over-free approach by way of the normal openings, or ostea, to the sinuses leads to easy invasion and infection, and such exposed sinuses seem to be the ones that are affected over and over again upon the occurrence of the slightest coryza.

But beyond this, to lay the sinuses wide open by way of abnormal or newly made approaches is to yield and forfeit once and for all any possible chance of a return to a near-normally functioning nose. Of course, in some extreme, unyielding cases of chronic, profuse suppuration, abnormal openings seem justified and necessary in order to get the benefit of gravity and freedom of drainage, but unfortunately the result is seldom more than partial relief or little improvement.

Radical exenteration with vigorous curetting in an attempt to remove or destroy the lining mucous membrane is, I believe, not good surgery. A diseased mucous lining I feel sure is to be preferred to exposed bone, for, diseased as it may be, the lining membrane seems capable of standing between a pus-filled sinus and endogenous infection. Many competent, long-experienced and qualified authorities are definitely on record with the statement that in their opinion the nasal accessory sinuses are decidedly negligible as foci or depots of endogenous infection. It is admitted that outpouring of pus from chronic, suppurating sinuses into the pharynx and on into the alimentary canal is a menace and a potent cause of gastric, duodenal, gallbladder and appendiceal disease, but to assume that radical exenteration of these cavities is sure to end such suppuration is unwarranted optimism. Reinfection and relapses of these crippled structures over and over again is my experience and observation. For this reason I am convinced that radical exenteration brings us no better result as to its effect upon the suppuration than conservative measures, and has the disadvantage of further crippling the nose by sacrifice of mucous surfaces and their underlying nasal structures of heat-producing function.

The younger the patient the more far-reaching is the atrophy that follows trauma and surgical sacrifice in the nose. Therefore surgery of almost any extent in the noses of children is little short of catastrophe. Dean and, too, the St. Louis School were largely instrumental in initiating the surgical treatment of sinuses in children, in connection with focal-infection troubles. Some of our pediatrician friends, too, were not less enthusiastic during the spread and indulgence of this ill-considered bugaboo. Fortunately, like all excesses of unestablished merit and worth, its

value or justification is rapidly receding even in the minds of its proponents. To discount at least 50 per cent of all innovations in medicine and surgery is a good and safe rule, and this radical procedure is a most flagrant example.

The importance and hazards of disease processes in the different nasal sinuses vary greatly.

Acute or chronic disease of the frontal sinuses is by far, in my experience, the most hazardous of all sinus affections, and furnishes all the mortality I have had in nasal sinus cases. When an initially acute or an acute flare-up of a chronic frontal sinus presents itself, with all the outward signs at the brow and in the orbit, decidedly energetic action in opening through the brow is indicated without the added enlargement of the passage to the nose, where recurring granulations only tend to make that route of drainage worse than if left alone to regain its permeability after recession of the swelling. Erosion through the internal plate, with meningitis by extension, rapidly supervenes unless promptly relieved.

The ethmoids have long been the object of excessive, radical and poor surgery. Complete exenteration of the ethmoids is the quickest way I know of making a climatic invalid. Most men of mature judgment and experience have limited themselves to the snare and the biting forceps in doing as conservatively as possible what will sufficiently ventilate and drain the ethmoid cells.

The sphenoid as well as the posterior ethmoid cells are comparatively unknown land to most rhinologists as a result of the very unsatisfactory interpretation of symptoms of disease in these cells. Operations done on the sphenoid are mostly limited to enlarging the normal ostium on its face. But even this procedure is very much handicapped and at a tremendous cost through the necessity of sacrificing some or all of the middle turbinate in approaching the sphenoid field. Rapid granulation, however, here as in most such places of approach to the sinuses, very considerably nullifies our efforts.

The maxillary antrum, by far the most assaulted sinus in rhinology, seldom presents any serious or emergency necessity. The maxillary cells can continue for months, or even years, the site of suppurative accumulation without any considerable local or constitutional harm.

An acute congestion or even infection of the antrum, as well as any one or more of the other sinuses, is probably part of all acute, severe coryzas or severe infections of the nose, and so long as ventilation and drainage are uninterrupted probably runs its course to recovery without any more unusual manifestation than the nose proper would show without a participating sinus. It is only when such interruption of ventilation and drainage occurs that we are confronted with the necessity of interference. By far the majority of such acute sinus involvements will progress to recovery by the mere shrinking of the mucous membrane in the region of the ostea. Often a mere boost to assist in regaining its balance as to ventilation and drainage will permit a nose to take care of itself. Surely shrinkage for a few days in succession is all that is necessary in the vast majority of cases.

Puncture into the antrum under the inferior turbinate, with irrigation, should not be done until it is evident that it is necessary, as manifested by little or no discharge in the presence of localized pain and feeling of pressure at the cheek. Many chronic antra have been started on their way by such unnecessary interference.

A chronic, suppurative antrum that is near to being a perpetual cesspool of putrefaction, however, is aided to decided improvement by making a moderate-sized window under the inferior turbinate through which, by gravity, this accumulation finds its way out, and through which irrigation occasionally can help to bring intervals of recovery. Intervals, I say, because practically all these artificially opened sinuses become reinfected with each cold or attack of coryza, and seem barely able to partially regain their freedom from discharge before they are again active. Discouraging, I should say, but nevertheless true. And right here I am willing to put myself on record as saying that this conservative window-making in the treatment of chronic antrum suppuration is the best that can be done for such cases. Any more radical procedure, in my experience and judgment, obtains no better result in the end and only adds to the invalidism of the patient by unnecessary sacrifice of defensive structures and tissues. I mean by this that radical exenteration of the antrum, including sharp curetting of the lining mucous membrane, breaks down an important barrier between suppuration and endogenous infection; in other words, creates an active focus of infection for endogenous distribution that according to the preponderance of opinion did not exist before.

The Caldwell-Luc operation in my opinion is

an extravagance in radicalism that should always have been challenged, except in the presence of major pathology (retained foreign bodies, dental cysts, tumor growth, etc.). Its advantage could only be in connection with better ability to exenterate the antrum, which I have previously condemned on account of the danger of increased endogenous infection. In addition, I cannot conceive of this approach to the antrum without the possibility of jeopardizing the apical dental nerves in the path of the resection, so close over the root-tips of at least two to three teeth. Devitalization of the neighboring teeth may be the price of this unnecessary procedure and surely cannot be ignored, especially in view of the fact that approach to the antrum can be fully and sufficiently made through the nose. Sensory disturbances of the cheek, too, as a result of injury to the infraorbital nerve may follow this procedure.

Up to this point we have confined our discussion to definitely infectious, suppurative, inflammatory affections in rhinology. Now we are to consider allergic, vasomotor and hyperplastic affections, and right here is the appropriate place in which to apply the subject of this paper, "Disillusionments in Nasal Surgery."

In my opinion, of all the affections and conditions in the human organism where surgery has been not only the least beneficial but, in addition, largely harmful, allergic, vasomotor and hyperplastic affections of the nose have been the most outstanding. Especially and positively is this so where, in these conditions, radical operations upon the sinuses in addition have been done.

I purposely mention together vasomotor and hyperplastic affections for the reason that their distinction and separation are not definitely established in my mind, and, too, because their association is so frequently present.

In approaching the consideration of vasomotor nasal affections, we come upon such an expanse of the unknown, or little known, and such a maze of biologic chemistry and anaphylaxis, with not only its phenomena of comparatively simple sensitization and desensitization but even fatal reactions, that we should pause and pause long. To assume that we are entirely safe in indulging unguardedly in surgery in the sphere of such potentialities is but taking chances. The possibilities of local surgical reaction upon patients in the anaphylactic state are tremendous, and could all such resulting fatalities have been accurately recognized and connected with the precipitating local surgical element much greater danger would be evident. With a comprehensive view in mind of the possibilities of local nasal reactions in association with protein sensitization and other anaphylactic states, surgical procedures in such cases would be approached much more timidly and cautiously than they are.

The writings of one of our own members, Dr. Shannon, on the exudative diathesis and anaphylaxis, were far in advance of their time, brought more comment from far and wide probably than most of our home-written articles, and are now being substantiated in current literature.

The term allergy, of rather indifferent meaning and interest to us, rapidly assumes its role of importance to each man who has had a fatality or near-fatality charged to him as the result of anaphylaxis. The dermatologists, the internists and the pediatricians know well the dangers lurking in the wake of intravenous medication and the dermal and subdermal administration respectively of vaccines and serums.

And now it is for us to ponder upon the possibilities of allergy as the original, initial cause of the common cold, which subsequently, sooner or later, has superimposed upon it the infectious and suppurative character of the malady. Of course a chronically involved, suppurative nose might go on and on without at any time entirely ridding itself of the infection. In such cases each acute exacerbation ushered in with coryza-like symptoms might be charged to the anaphylactic state of the patient, and be the beginning, also, upon which each exacerbation of suppuration takes place. In the other hand, a nose affected for the first time, a nose of virgin soil, so to speak, would have its initial coryza directly and wholly as a result of an underlying anaphylactic state of the patient.

Much time and effort in research have been given to the determination of the cause or causes of the common cold. For the most part, however, this work has been directed to the bacteriological aspect of the subject, which, however, according to the above hypothesis, would be but the complication of and not the initial cause of this long-studied malady. Allergy initially may prove to be the answer.

Vasomotor rhinitis presents two commonly recognized types: (1) the distinctly seasonal type; (2) the perennial type.

The first, or seasonal, type is unquestionably

due largely to a specific irritant. The second, or perennial, type is due to nonspecific or manifold near-specific irritants. Dr. Shannon's proposal of the capabilities of nonspecific irritants in patients in the anaphylactic state would fully explain the causes of perennial vasomotor rhinitis and the local manifestation of violence due to a concentration of antigens at the point of any kind of specific or nonspecific irritation, including surgical trauma.

In many biochemic processes in the animal organism the balance of normalcy is easily upset by some apparently casual influence, but nowhere is there a hair-trigger-like control so susceptible as that upon a basis of anaphylaxis or allergy in the patient. Irritation is mild trauma, but trauma nevertheless, be it chemical, thermal, mechanical or surgical, and the existing precipitating trauma of a very far-reaching pathologic process may be but very superficially separated from its unsuspected latent basis. Arthritis, for example, and arthritic pathology may be held just in the balance of body chemistry until some most insignificant trauma unbalances the scales of control.

Taking the opportunity of going into the fascinating subject of allergy is not the purpose of this paper, but merely to lay a foundation for argument against surgical procedures in this type of case that are not only of no benefit but which are positively harmful in breaking down by trauma and crippling the already jeopardized balance of resistance in these structures.

The best chance that nasal structures have of reëstablishing their normal physiologic function is by returning as near as possible to their normal anatomic state. Surely such sensitized structures as we find in a vasomotor affected nose have less chance of resuming their normal allergic balance and, too, of resisting superimposed infection and suppuration, in the presence of traumatized, fibrous, scar-infiltrated tissue and, in case of the sinuses, wide-open exposed cavities which were never intended to be exposed. Even in infected suppurating sinuses the minimum artificial opening and exposure of these cavities should be the last resort in securing the necessary ventilation and drainage. Vasomotor noses, in further argument, may exist indefinitely free of the added pathology of infected suppurating sinuses which to a major degree, in that condition, would be the only reason for artificially opening and exposing such cavities. Such infection and suppuration in the sinus cavities of vasomotor noses may not take place until they are laid open and exposed.

Often, in these days of the sinusitis bugaboo, every symptom of heaviness, uneasiness and pain is taken for sinus infection when in reality many times, including even severe migraine attacks in patients of such predisposition, it is but due to the pressure of engorged turbinates or temporary ventilation inadequacy, without any suppuration, in these airtight cavities of such waterlogged noses.

To be sure, appropriate measures of treatment are to be striven for in the vasomotor or allergic type of nose trouble, but such measures are for the most part decidedly not surgical. The ideal treatment, of course, is by way of approaching and eliminating, if possible, the underlying allergic or anaphylactic basis, dietary and otherwise, and excluding so far as possible the exciting irritants, both specific and nonspecific.

Shrinkage of these noses with very weak (one per cent) cocaine solution, to which a few drops of adrenalin to the ounce are added, followed by liberal covering of the mucous surfaces with a spray of bland oil, is the best measure available for immediate relief. If continued use at home of this spray of bland oil is kept up for the purpose of protecting the nasal surfaces from continued irritants, really all that it is possible to accomplish has been done for the time and can be repeated for relief.

Each man, according to his experience, will endeavor to do the best he can to meet the acute condition that confronts him, but there are some cases that will not tolerate adrenalin, cases which apparently are made worse by the above-mentioned weak solution of cocaine and adrenalin. All, however, seem to tolerate the bland oil and are, at least in a measure, relieved by it.

Ephedrin, while a wonderfully efficient drug if used under the direct control of the rhinologist and for a short time only, is capable of more harm and longer lasting damage than any other drug in the rhinologist's armamentarium. Like aspirin, but much more harmful, ephedrin is is passed over the counter without limit to every person who asks for it and without a word of caution, either spoken or printed. As a result, many times its use is continued in quantity and frequency until the totally paralyzing effect to the vasoconstrictors of the nose is complete. Then we are in trouble, for, use what we may, until

the resulting vasomotor paralysis begins to pass off nothing is effective in shrinking the totally waterlogged nasal tissues, and the patient must go for days with a completely closed nose. The effect of the paralysis to the vasoconstrictors following ephedrin poisoning, it is said, takes several weeks to completely pass off. Some steps by the proper authorities should be taken to safeguard the public against the harmful effects of the uncontrolled and unrestricted use of this otherwise wonderful and useful drug, and physicians should be more circumspect than to prescribe it as indifferently as they do. Ephedrin, when it is employed, should be used cautiously, and but for a short time, as a spray to reach the upper half of the nose, not as "drops" which, running along the floor of the nose, affect only the lower parts of the inferior turbinates. It is the engorged inferior turbinates, in the state of vasomotor paralysis, that we most frequently see as the result of the overuse of "drops" so extensively prescribed, as well as sold without prescription.

In considering surgery in the nose as a whole, but not in any one type of nasal pathology, it surely has a place of importance in well-considered, guarded and conservative procedures, but certainly not often in major, radical and destructive sacrifice of mucous surfaces and their underlying framework, much too frequently indulged in in the past. Taking advantage of the opportunity for simple readjustment and correction of faultily placed nasal structures instead of resorting to extirpation, exenteration and resection, is the most beneficial practice in rhinology, for it must be most definitely kept in mind that in the nose especially a return to physiologic normalcy requires corresponding anatomic normalcy. In-fracture and out-fracture of misplaced turbinates, and the careful crushing of abnormally large turbinates with cautious avoidance of macerating the covering mucous membrane, are preferable in all comparison to the resection of these valuable and indispensable structures in the nose. The perfectly controlled cauterization of hypertrophied lower turbinates with trichloracetic acid is much safer than the the seldom correctly estimated surgical resection. These and many other simple and conservative measures in the end accomplish more good than the more radical method.

The submucous resection of the septum promised for a time, without apparent qualification, to be the greatest boon in the hands of the rhinologist as a means of gaining room in crowded noses without the sacrifice of mucous surfaces or their underlying framework. And it really has solved this long-studied problem, but even this great improvement over old methods may have unfavorable consequences in a portion of cases where it is done.

In my own experience I have seen quite a number of noses develop most exaggerated vasomotor qualities following the submucous septum operation without having had any suggestion of such a tendency before. This, of course, can be explained by our theory of a precipitating irritation (in this instance, surgical trauma) in the nose of a patient with an underlying allergic or anaphylactic basis. As a result of this experience my enthusiasm for this procedure has been held in abeyance and has considerably cooled for the reason that these patients, even though they had decided bony obstructions previously, became much worse off after the septum operation than they were before.

Fortunately this unfavorable change does not happen frequently, and the septum operation still remains most decidedly the best of all procedures for the purpose of gaining room where it is necessary for ventilation and drainage of the sinuses, which latter condition is the cardinal requirement for the normal health of these cavities.

I think that the idea is altogether too prevalent among the profession that perfectly executed operations of standard prescribed procedures upon the sinus are all that is necessary to relieve these troubles, when in reality it is but a minor part of the problem of getting these cavities back to their normal physiologic state after being subjected not only to infection, but also to added surgical trauma and changed anatomical relationship.

If it could be assumed and were true that all well-executed surgical jobs in the nose yielded good end-results in the form of restored, normally functioning noses, rhinological surgery would be a delight, but the restoration of normal function is something we cannot deliver in extensively operated noses; and the whole question, summed up, resolves itself into this proposition: Postoperative physiologic restoration is in direct ratio to postoperative anatomic restoration.

THE TREATMENT OF BURNS*

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THE first consideration in the treatment of any burn is the preservation of the patient's life, when life is threatened by shock, toxemia or blood concentration; the second is to so treat the wound that healing will be completed in the shortest space of time consistent with the first consideration; and then, reconstruction. They are of importance in the order named.

For years the only classification of burns used in this country was based on the depth of the burn: first degree, erythema; second degree, vesicle formation; and third degree, the partial or complete involvement of the skin and underlying structures. Now we consider also the extent of the burn. Burns of the first degree are usually fatal[6] if two-thirds of the body surface is involved, while if one-third of the body surface in adults, and one-seventh in children, is involved in a second degree burn, a fatality usually results. It is therefore desirable to classify burns both by the depth and the amount of body surface involved, as a 25 per cent first degree burn, a 10 per cent second degree burn, etc. The estimation of the extent of body surface involved can be based on Berkow's work,[3] who showed that the lower extremities, including the buttocks, comprise 38 per cent of the body surface; the trunk, including the neck, 38 per cent, the upper extremities 18 per cent, and the head 6 per cent. The hand is one quarter of the upper extremity, the foot is one-sixth, the leg one-third, and the thigh one-half. This area determination of the extent of burns does not apply so well for children, as a burn comprising a certain body area is much more serious in a child than a corresponding area in an adult.

The immediate result of a burn is the initial shock; then follows toxemia, which is probably not produced by the absorption of a soluble substance developed in the burning of living tissue, but more probably is produced, as Underhill and his co-workers have shown,[9] by excessive concentration of the blood in the person injured.

The initial shock in any seriously burned patient is closely similar to any surgical shock, with the fortunate blunted sensibility, cold moist skin, subnormal temperature, rapid pulse and lowered blood pressure. The important consideration at this stage is not the degree of the burn but the degree of shock present. Morphine is given to control pain, external heat is applied, fluids are given by whatever methods are practical, and great care is taken in the removal of any clothing. When the patient's condition warrants it, treatment of the burn can be started.

Few contributions to the therapy of burns have been as epoch making as Davidson's[4] tannic acid treatment. Davidson first used moist compresses of a 2.5 per cent tannic acid solution applied over the burned area, and kept moist until the area was thoroughly tanned. A short time later, Beck and Powers[1] advocated the use of a spray, which has become generally adopted. However, as most burns are emergencies in industrial work, preparation is made for their immediate treatment preceding hospital care. Clean sterilized quart Mason jars with one ounce of powdered tannic acid in each are kept readily accessible. A large printed sign above these jars and a smaller sign on each jar, advises to fill the jar two-thirds full of clear water, shake and then apply freely to the burned area. The tannic acid dissolves readily in water and there is no delay. Large squares of gauze are laid over the exposed areas, are thoroughly saturated, the patient is covered with two blankets and sent immediately to the hospital. No attempt is ever made to remove any clothing involved in the burned area until the patient is seen at the hospital.

Patients coming from homes or from places where no first aid care is given, almost invariably, it seems to me, are covered with some ointment or grease. Carron oil and heavy lubricating oils seem to be the chief offenders. Needless to say this must all be removed before any tannic acid treatment can be instituted, and it always seems a tedious task to the surgeon, and always a painful one to the patient, especially when sol-

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vents are necessary. An anesthetic may be required.

The hospital treatment is well known to you all. The removal of dead skin; the use of the spray; the cradle and the external heat; the prevention of circulating air around the wound; and the warmth of the patient's room. The only possible item of interest here that I might add is that after experimenting with several types of imposing spraying machines we have descended to the use of the hand pump spray manufactured by the makers of liquid insecticides. It has the unique virtue of being both cheap and efficient.

Coincident with the institution of treatment of the burn itself, is the institution of measures to lessen the dehydration of the body. Blood transfusions may occasionally be deemed advisable, though some surgeons use them routinely in all severe cases. Fluids, particularly normal sodium chloride solutions, are almost invariably indicated in amount from five to eight liters in twenty-four hours. Beckman[2] has laid down a rule of one liter for each twenty-five pounds of the body weight every twenty-four hours. This replacement of fluid to the body is essential, as it has been proven that there is a water loss from the blood stream amounting to as much as 70% of the total volume of blood following burns. Davidson[10] and Mathew[5] explain the resulting blood concentration by assuming an early increased permeability of the capillaries. This increased permeability is effective in only one direction, as reabsorption in the burned area is very meager for some time following a burn.

Too high a concentration of the blood is incompatible with life. Pack[8] writing in elaboration of his work with Underhill[9] states that an increase of 40 per cent in hemoglobin for a short period only will cause death, while an increase of 25 per cent places the patient in a critical condition. The persistent increased concentration of blood results in the phenomena of failing circulation, oxygen starvation of tissue, oliguria and death.

The determination of the hemoglobin content of the blood is therefore important as a guide for the amount of fluid and salt necessary to reestablish normal fluid balance in the body. Fluid replacement is hastened by the use of intravenous saline solutions, and rendered more lasting by the use of either blood transfusions or solutions of acacia, which has the property of holding the water within the body. In the use of the latter, it is preferable to use normal saline both before and after.

The oliguria, when present, can hardly be classed as a true nephritis, as it is not usual to find at post-mortem examination of patients dying from burns, uncomplicated with sepsis, any pathological changes in the kidney. The oliguria is probably due also to the increased concentration of the blood, and the inability of the kidneys to take care of the abnormal blood furnished to them. The blood concentration also readily explains the higher urea findings, irrespective of any nephritis.

Tetanus antitoxin should be used in all cases. While it has been maintained that most of the recorded cases of tetanus following burns are in reality due to edema of the brain or thrombosis, I would prefer personally to be guilty of having given antitoxin, than to be conscious that I have failed to give it should "edema of the brain or thrombosis" develop.

The tannic acid treatment of burns is also an important factor in the equalization of body fluids, as its early use reduces the loss of water from the burned area. Usually after six or eight hours a crust is formed over the burned area, and within twenty-four hours this crust is well established, thereby effectively lessening the permeability of the capillaries. If no infection develops, this crust is not removed until it loosens; the crusts curl up around the margins and are daily trimmed off. If infection should develop around or beneath the crusts, they are softened with Dakin's solution and removed, and routine Dakin's treatment of the wound is instituted. Montgomery[7] warns against the use of boric acid dressings in the treatment of burns at this stage, stating that "a rapid toxemia develops which is frequently fatal."

After all the crusts from the tannic acid treatment have been removed, oxyquinoline sulphate combined with scarlet R, and a small amount of chloretone for its anesthetic action, is applied as an ointment to the new epithelium. Later, if necessary, skin grafts are applied.

The third phase of the treatment of burns, or the reconstruction of scars and contractures arising from them, involves the whole subject of plastic surgery. A simple skin graft only, or a most extensive reconstructive process may be re-

quired. It is neither the intent nor scope of this paper to enter this phase of the subject.

In conclusion, the first consideration in the treatment of the severely burned patient is the preservation of life. The tannic acid treatment, with its resulting diminution of loss of body fluids, its relief to the patient and its satisfactory end-results, is almost universally accepted. The prevention of shock to the patient, the constant determination of hemoglobin content to check the concentration of the blood, the restoration of the body fluid level, reestablishing the normal blood chlorides, are as equally important as the actual treatment of the burn.

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GUNSHOT WOUNDS OF THE ABDOMEN*

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AS SOCIAL conditions change, physicians are called upon to meet changes in their practices. With the hunting hysteria brought on by the opening of the short pheasant and duck season, many individuals having little or no experience with firearms are turned loose in our fields as a menace to themselves and others. Later in the season the northern part of the State is covered with hunters who are armed with high powered rifles. These individuals often little realize the distance a bullet may carry and prove fatal. These facts, accompanied by a certain amount of buck fever, throw many into a state of incompetence. The above two hazards are more or less seasonal.

The increasing prevalence of the gangster and his unexpected appearance in almost any village or hamlet make it not at all unlikely for a physician in even the most isolated village to be called upon to care for a gunshot wound.

It is because of the above that it seems to me desirable at this time to present this subject. I am particularly interested in presenting the subject of gunshot wounds of the abdomen.

Keen[1] states that wounds of the small intestines are more serious than those of the stomach. In the Civil War all died. At San Diego four soldiers were operated upon for abdominal injuries and all died. In the Boer War 62 per cent died. At the University Hospital of Baltimore, out of twenty-three cases reported the mortality was 56 per cent. During the World War much improvement was shown in the mortality from all wounds except those of the abdomen.[2] Death most frequently comes from shock and hemorrhage; later from peritonitis.[3] The prognosis of stab wounds of the abdomen is much more favorable than that from gunshot wounds.

The location and amount of damage done by a bullet is so varied that simple inspection of the wound gives but very little reliable information. A bullet may go through the abdomen without penetrating the peritoneal cavity. Webb[5] reports

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a case of gunshot wound of the abdomen in which the bladder was punctured anteriorly, permitting the escape of urine from the entrance wound, and fecal matter posteriorly through a sacral wound. On opening the abdomen it was found that the bullet had not entered the peritoneal cavity at all. Later I shall report a case in which a bullet entered the back at the fourth lumbar vertebra, came out two inches above the ensiform, and did not enter the abdominal cavity.

Vale[3] reports a case of a man shot by a bandit through the abdomen from side to side at the level of the umbilicus. The bullet passed between the coils of the intestines, only slightly injuring the mesentery.

Bottomley[4] states that there is no sign or combination of signs sufficiently constant to serve as a basis for diagnosis or treatment. The time for relief from operation is usually past when a positive clinical diagnosis of visceral injury can be made. The rigidity is not so marked as it is following perforated ulcers, although there is usually a marked amount of shock. While the abdomen does not seem to tell much of the story, the facies give a picture of one who is in a serious condition, similar to that of an advanced general peritonitis. There is rarely any question as to the entrance or exit of the bullet.

When confronted with an abdominal gunshot wound the first thought that presents itself to the physician should be whether or not the missile has penetrated the abdominal cavity. Of course if it is palpable in the abdominal wall the expectancy treatment is the only one to follow. If it cannot readily be located, it is advisable to take antero-posterior and lateral x-rays. If the bullet is then located, and it can be satisfactorily demonstrated that the peritoneal cavity has not been penetrated, the abdomen should not be opened. The bullet wound may be debrided and its course determined, and then closed tightly. However, if there is the slightest question as to the probability of its having perforated the peritoneal cavity, the surgeon, in view of the slight mortality from laparotomy, is justified in making a careful inspection of the abdominal contents.

When the surgeon has decided to open the abdomen he should keep before his mind the fact that patients do not die from penetrating wounds themselves, but lose their lives from shock, hemorrhage, or infection.[4] Transfusion and intravenous or subcutaneous administration of fluid or nourishment, if used within a reasonable time after the injury, should save most patients from the effect of hemorrhage.

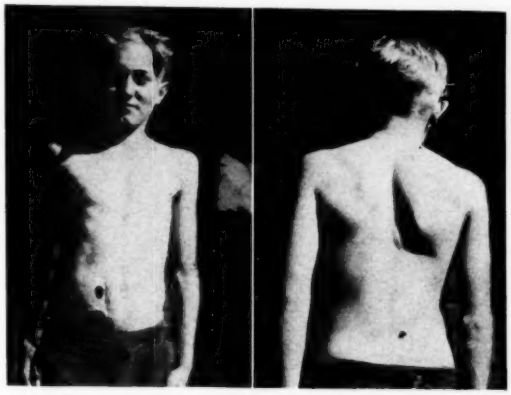

Fig. 1 (*left*). Case 2. Note entrance of bullet.
Fig. 2 (*right*). Case 2. Note exit of bullet.

The operative incision is usually in the midline, should be large, and operation should be carried on with as much rapidity as can be done with safety. On opening the abdomen the first thought should be to ascertain the amount of hemorrhage and to control it. Then the larger viscera in the region of the wound should be carefully inspected and all portions of the large bowel. The small bowel on account of its motility should be examined in its entirety, passing it from one hand to the other until it has all been inspected.

If after controlling all bleeding and repairing all injuries there is any difficulty experienced in returning the coils of the bowels that may be outside of the abdominal wound, they can usually be easily replaced by grasping the wound on either side with the hands, and raising the abdominal wall rather suddenly. The inrush of air will usually carry the bowels in with it, thus avoiding possible injury to the bowels by an attempted manual reduction. The viscera should be replaced in their anatomical positions as nearly as possible. The omentum should be brought down to cover the bowels.

The question of drainage is one largely dependent on the individual surgeon's experience. Drainage of the entire abdominal cavity is impossible. No single drain will drain more than a few hours before it is walled off. Accumulations may occur in the pelvis and a drain may be

inserted there. Also accumulations may occur in the flanks and may be drained. The peritoneum will quickly wall off some contaminations. Early operation and minimal drainage is most desirable.

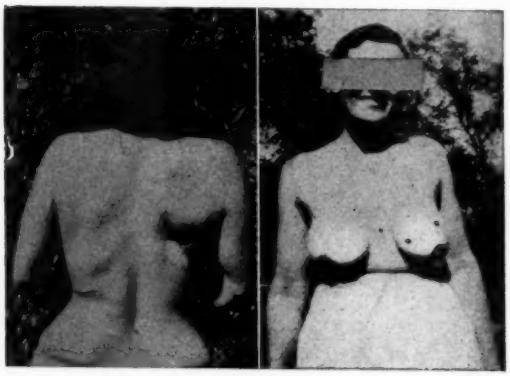

Fig. 3 (*left*). Case 3. Note entrance of bullet at fourth lumbar vertebra.

Fig. 4 (*right*). Case 3. Note entrance and exit of bullet through the breast, also exit of another bullet which entered from the rear 1.5 inches above the ensiform cartilage.

The later the operation the more drains are required and the greater the mortality.

Wounds of the small bowel cause less contamination than those of jejunum or stomach. Possibly all stomach and jejunum wounds should be drained; the drainage of others will depend on the amount of soiling of the peritoneum. The infection can be very materially reduced by a careful toilet of the abdomen, which should include suction.

After-treatment should consist of the giving of antitetanic serum in all gunshot wounds, in any part of the body. Because of this preventative treatment, tetanus has been reduced from 71 to 0 per cent. Before giving the serum it is well to ascertain if the patient has had diphtheria, has been given any other serum, has asthma, or is susceptible to horse dander. If in doubt, the serum should be diluted one to two hundred and one or two drops injected into the skin. If no reaction occurs, larger and more concentrated amounts may be used until the full dose is tolerated.

The patient should be put in Fowler's position, at least 3,000 c.c. of fluids given every twenty-four hours by hypodermoclysis or by vein, fluids by mouth being withheld until the probability of the development of peritonitis is past.[4] Morphine should be used very freely to relieve restlessness and pain. It may be pushed until respiration drops to eight or ten per minute and may be continued for as long as seventy-two hours.

If ileus occurs it should be treated with the Levin nasal tube and suction, which usually gives quite prompt relief. When the large bowel or the ileum is involved, an enterostomy is also very helpful. This is a simple procedure which may be of considerable help postoperatively. A stab wound is made through the left rectus region and a catheter is passed through the stab wound into the abdomen. The omentum is grasped and the catheter passed through it. The small intestine above the involved area is grasped and a small pursestring suture is placed in the wall. An opening is made in the center of the pursestring and the catheter is passed into the lumen of the intestine for about six inches and the pursestring is drawn tight. The catheter is buried in the wall of the intestine for two or three inches by a continuous Lembert suture. This procedure puts the involved bowel below at rest and the catheter is removed as soon as the abdominal symptoms have subsided, which usually occurs after four to six days. Passing the catheter through the omentum minimizes the danger of the small intestine becoming fixed to the abdominal wall.

I wish to report three cases which illustrate three types of gunshot wounds of the abdomen: (1) that involving a large amount of abdominal tissue loss; (2) that in which there is a single missile, with perforation of one or several of the abdominal contents; (3) that where many shot enter the abdomen with perforations somewhat widely separated from each other.

Case 1.—Extensive loss of abdominal tissue. B. C., twenty years of age, was riding when his shotgun discharged, entering his abdomen in the midline about two inches below the ensiform cartilage, cutting the seventh and eighth costal cartilage and the ribs at the anterior axillary line, carrying away a portion of the left lobe of the liver and also the upper portion of the spleen. He was picked up, carried to a farmhouse and was seen by the aid of a kerosene lamp. He was in moderately severe shock. On loosening his underwear the stomach protruded through the abdominal wall similar to the presenting of the head over the perineum. The two cut portions of ribs lay loose in the flesh and came out during the manipulation. The anterior wall was sutured around the margin and packed with gauze. The hemorrhage of the liver was controlled with a firm pack, as was the oozing from the spleen. The pack was not removed for two days and the wound was repacked until it healed. On account of the large amount of

abdominal wall destroyed, it was impossible to approximate the remaining parts. He recovered with a rather large hernia which has caused him considerable inconvenience since.

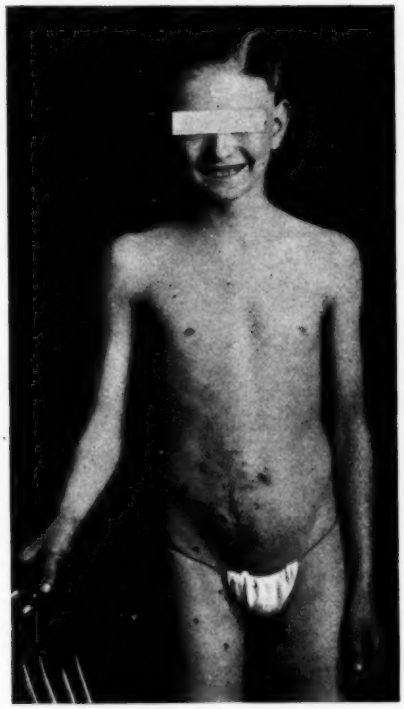

Fig. 5. Case 4. Shotgun wound of the abdomen.

Case 2.—Abdominal wound from a single missile. L. W., aged 11, was playing Indian with his older brother. As he crept up a dry creek bed, his brother, about 300 feet from him, called a halt and in true frontier fashion fired a .22 rifle at him. The bullet entered the abdomen about two inches to the right of and above the umbilicus. He was seen about one hour afterwards. Omentum was protruding about one and a half inches from the wound and he was in severe shock.

He was taken to the hospital, given stimulation, and saline subcutaneously. Laparotomy was performed and a large amount of free blood was mopped out. The injury to the mesentery was repaired and the hemorrhage controlled. There were three holes in the small bowel, two in the cecum, and two in the colon at the junction of the ascending and transverse colon. It was at this last point that the severe bleeding had occurred in the mesentery. As he complained of pain in the back before operation, careful inspection was made. The bullet was palpable in the lumbar muscles. Incision was made and the bullet recovered. Drains were put into the pelvis, and one up towards the hepatic area. He bled rather freely through the drains for two hours. He was given glucose, antitetanic serum; and made an uneventful recovery.

Case 3.—Only apparent penetration of the peritoneal cavity. F. A., a woman, 35 years of age, was shot in the left breast with a 32. The bullet glanced from the ribs and emerged from the lateral portion of the breast. She was then shot in the third lumbar vertebra a trifle to the right side of the spinal process. This bullet came out about one and a half inches above the ensiform cartilage. She was brought to the hospital an hour and a half later, unconscious, and in profound shock. X-ray showed free blood in the right pleural cavity. An exploratory laparotomy was deferred on account of the very severe shock and an uncontrollable hemorrhage in the chest. Paralysis was almost complete below the point of entrance of the bullet. She was given stimulation, antitetanic serum, heat and other appropriate measures, and gradually overcame the shock. After a long and very stormy course, which included gangrene of a portion of the right lung and a thorcoplasty of the right side, she now walks with difficulty, having little or no strength in the left foot. It would seem almost impossible that this bullet could have gone almost lengthwise of the abdomen without doing any serious damage and missing the important abdominal organs.

Fig. 6. Case 4. Roentgenogram showing shot remaining after recovery. Note shot in the gallbladder.

Case 4.—Wound in which many shot enter the abdomen. O. H., eleven years old, pulled a 20 gauge shotgun through the fence behind him. The gun discharged, striking him in the palm of the right hand, cutting away a portion of the palm down to the palmar fascia in the

wrist, the major portion of the shot striking him in the lower right quadrant of the abdomen. He was brought to the hospital in severe shock with thirty-four holes in the abdominal wall.

On opening the abdomen I found a large amount of free blood mixed with intestinal contents. There were forty-six holes found in the small bowels. These were distributed quite generally although in places they were not far apart. An attempt was made to close with pursestring sutures. This caused so much distortion of the bowel that it had to be abandoned. I then used Halsted mattress sutures, bringing one end back under the transverse portion and back to its original position. When this was tied it gave a firm closure with little anatomical distortion. Shot could be felt in the bowels and later when his bowels moved, he passed some shot. After careful toilet of the abdominal cavity, rubber drains were inserted up to the hepatic area and another back of the bladder into the pelvis. No fluids were given by mouth but they were pushed to the limit intravenously and subcutaneously. He made an uneventful recovery. The x-ray shows that he has twenty-three shot in his body, one of them being in the gallbladder, two in the pelvis, and one or two in the thigh.

Conclusions

1. Gunshot wounds of the abdomen should be treated immediately or not at all.
2. Shock and hemorrhage should be controlled at the earliest possible moment.
3. Routine inspection and palpation of each organ in the abdomen should be carefully carried out.
4. Treatment should be carried out in the assumption that peritonitis is present, as this is the only way mortality will be lowered.
5. Tetanus vaccine should be given in all cases of gunshot wounds.

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COMMON EYE INJURIES*

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OCULAR injuries are extremely important and well deserve a place on your nicely balanced program. It is unquestionably true that industrial eye injuries are less frequent now than a few years ago because of the safeguards developed to protect the eyes of workmen. On the other hand, injuries due to automobile accidents have increased steadily. Add to these the injuries received in childhood play and in the world of sport and we have a large number of cases of various degrees of seriousness.

An enumeration of some of the injuries we have seen may not be amiss. There were several lid injuries from glass cuts, mostly from automobile accidents. Foreign bodies in the cornea were by far the most frequent injuries seen. Lacerations and perforating injuries to the globe were caused by windshield glass, an explosion of a partly filled water bottle in a bonfire, a child's celluloid toy, a nail which was being removed from old lumber, a bit of wire in a barnyard, a a fall on a broken glass tumbler, scissors and knife blades, sled-runner, wooden sword, a blow from a whiplash, and from snapping back of a small branch of a tree.

Penetration of the eyeball by foreign bodies has been mostly from small particles of metal, usually steel, in workingmen who were striking steel with steel. Two have been from explosion of dynamite caps. Foreign bodies in the orbit have consisted of wood splinters in a small boy who died from meningitis, B-B shot and 22 caliber bullets.

Injuries to the lids are important both from a cosmetic and functional standpoint. If they are longitudinal and superficial, healing takes place nicely with little danger of deformity; if through the entire thickness of the lid, care must be exercised in suturing in such a way that there is no inversion or eversion of the lid. If the levator tendon of the lid has been divided, it is necessary to bring the ends together. In one of our cases

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the upper lid was practically torn loose in its entire length in an automobile accident, but with careful suturing it was restored to almost perfect function. If the wound is vertical and extends through the lid margin, there is a gaping of the edges. The skin must be sewed carefully with silk or dermal, but in addition stay sutures which are placed more deeply, even through the lid, at some distance from the wound, are necessary to combat the tension arising from swelling of the lid. If there is loss of substance in a tearing or contusion wound, it may be necessary to make a sliding flap or a skin graft. Fortunately the lid is richly supplied with blood, and infections are not common. One must not forget, however, the danger of tetanus in these wounds and forestall its development with antitetanic serum.

Whenever there has been penetration of the lid or a conjunctival wound, one should be very careful that there is no foreign body in the orbital tissues. This is true of wood splinters, glass, metal particles, stone and many other substances. Limitation of movement or fixation of the globe, with or without pain on movement, should call attention to foreign material in the orbit. The little boy mentioned previously developed an orbital abscess from a retained splinter of wood, later dying of meningitis. All the conditions spoken of were present here, but apparently his physician had not recognized the fact that the foreign body was present. Foreign material such as small shot, bullets, small iron bits, copper or stone may often be left in the orbit and produce no reaction. They usually become encapsulated rather quickly and rendered inert. X-rays should be taken where there is the slightest question and the presence or absence of foreign material determined. It is then a question of judgment whether or not an attempt should be made at removal. If in such location that there is little disturbance to the important structures of the eye, I think they should be removed. If there is danger of severe injury in the removal and the material is such that we may expect more than an even chance that no ill effects will ensue, I feel that they are better left alone. From the tragic ending of the one case with wood in the orbit and from cases cited in literature, I do not feel that way about this particular substance.

Injuries to the cornea may be anything from a simple abrasion or erosion from small foreign bodies under the lid or from inverted eye-lashes, from fingernail scratches, twigs, edges of paper, curling irons and a host of other objects, to lacerating wounds which may or may not perforate the cornea, and ruptures.

The most frequent corneal involvement is perhaps from foreign bodies, more or less imbedded in the corneal tissues, sometimes so small that they are difficult to find with the naked eye. For removal of all foreign bodies in the cornea a loupe should be used for magnification. Often enough patients come for relief from "conjunctivitis," or because they feel sure they have something in an eye which they have been told by their physician is not present. Many of them do have foreign bodies or breaks in the corneal tissue with a ring of rust or some other staining material which gives them the foreign body feeling. A very great help is the use of the stain, fluorescin in 2 per cent solution with 2 per cent sodium bicarbonate. If there is any break in the corneal epithelium there will be a vivid green staining with this substance. The ophthalmoscope may also show a dark area or spot in case of an abrasion or foreign body, when one searches from different angles against the background of the fundus.

For the removal of foreign bodies from the cornea, a local anesthetic should be used even in the simpler cases, to prevent undue damage to the cornea from movements of the eye. The commoner solutions used for local anesthesia of the cornea are butyn 2 per cent, cocaine 4 or 5 per cent, holocaine 1 per cent, alypin 2 per cent and pantocain 0.5 per cent.

Cocaine has the disadvantage of producing a dryness of the cornea and sometimes a sloughing of the epithelium as well as a dilation of the pupil, and I rarely use it for foreign body work. Butyn gives a very satisfactory anesthesia without these disadvantages.

For the removal of very superficial bodies a small tightly wound cotton applicator moistened with boric acid solution is sufficient and should be used in all cases which seem suitable. If there is stain left behind or if the foreign body is more deeply imbedded, a sharp spud should be used and every vestige of discoloration in the cornea removed. Many of the spuds made for this purpose, I feel, have too broad a point, causing an unnecessary disturbance to the surrounding tissue. My own choice is an old cataract knife with a fairly fine point. By having the patient fix his gaze on a given point, except in rare instances of young children or highly nervous individuals, only

a very small area of the cornea is then disturbed.

It hardly seems necessary to say that a measure of asepsis is necessary in the treatment of these cases. In the after-treatment there may be a temptation to do too much with antiseptic solutions and drops. If there is not already infection present, nature is kind and supplies tears, which are very effective as cleansing agents. This action of the tears is more than the mere mechanical flushing of the eye. Fleming (1922) described an enzyme found in small quantities in all animal tissues and in most body secretions, which he called lysozyme. Ridley identified this enzyme in the tears in 1928. The concentration in the tear fluid is one of the highest found in the body. When this concentration is normal, staphylococci, streptococci, gonococci and meningococci are readily killed. This action is lessened when there is excessive tearing, probably the result of dilution. It has also been shown that some of our favorite antiseptics destroy its action. In most cases the eye should be covered until the surface has been restored. If antiseptics are necessary, metaphen (1-2500) or mercurochrome (2 per cent) may be instilled or bichloride ointment used. If there is much irritation, particularly if the foreign body has been present for some time, it is well to dilate the pupil with atropine in the form of drops or ointment to put the eye more completely at rest.

If the wound is infected, corneal ulcer, iridocyclitis or even panophthalmitis may develop. Treatment of these conditions cannot be covered in the short time we have for this discussion.

Perforating wounds of the cornea, corneoscleral region and sclera give much concern. There is usually some prolapse of the iris as the aqueous escapes. If the penetration is through the depth of the anterior chamber there is injury to the lens capsule or lens substance with the formation of traumatic cataract. If infection is carried into the eye we again may have varying degrees of inflammatory reaction, even a severe panophthalmitis. Escape of vitreous humor causes a varying degree of collapse of the eyeball.

In absence of infection, wounds of the cornea alone are usually not serious problems. In small puncture wounds, the iris may be washed up to the posterior surface of the cornea and become attached, sealing the opening, and causing a misshapen pupil as the iris is drawn toward the wound. With longer wounds the iris is prolapsed and appears in the wound. When the injury extends through from the cornea to the sclera the ciliary body is injured. It is these cases that cause us most concern, because they are the ones in which sympathetic ophthalmitis may develop.

After 350 years, during which time sympathetic ophthalmia has been recognized, we are still at a loss to know just why it occurs. We know that the infection is in the uveal tract and follows injury, but how it occurs in the second eye, after injury to the first, is still unknown.

Some of the largest verdicts given in malpractice suits have been in cases of sympathetic ophthalmia. The patient or some member of the family should be told of the possibility of this complication in any severe eye injury and should take some share of responsibility. It is wise also to have consultation when the question of enucleation arises. When an eye is hopelessly mutilated and no hope of any useful vision exists, there can be little question of the wisdom of early enucleation.

Sympathetic ophthalmitis does not always appear soon after injury, but may come years afterward. A small foreign body may penetrate the eye and be present for years. Thus where there is the slightest possibility of a penetrating foreign body, x-rays should be taken. One must not depend on a patient's statement that no foreign body could have entered the eye. If a foreign body is found to be present, every effort should be made to remove it. It is a comparatively simple matter to remove a foreign body consisting of steel with a magnet, providing it is not tiny or that it has not been present long enough to have become fixed by organization of tissue around it. If non-magnetic, the globe may be opened and removal attempted with forceps. This is often next to impossible without so much damage to the intraocular structures that no good can be accomplished.

While it is a grave responsibility in some cases to leave an injured eye in place, it is also a great responsibility to advise its removal. Maitland, in the *Annals of Ophthalmology*, January, 1904, gave the following rules, which I think are sound:

1. Enucleate at once when the injury is so severe that the exciting eye is destroyed hopelessly from the beginning.
2. Enucleate at once on the slightest sign of sympathetic irritation should the vision of the exciting eye only equal a perception of light and darkness.
3. Enucleate at once if a foreign body is present in, and cannot be removed from, the exciting eye.
4. Enucleate at once when an injured eye is blind

and suffering from recurrent attacks of acute inflammation, or when it is tender and irritable as a result of the onset of degenerative changes, *e.g.*, ossification of the chorioid.

5. Do NOT enucleate when there is still sight in the injured eye, and when there is no sign of sympathetic disturbance in its fellow.

6. Do NOT enucleate when sympathetic inflammation is in progress and there is still sight in the injured eye, for under these circumstances the removal of the "exciter" will have no beneficial influence and the probability is that in the end all the sight the patient will possess will be in the primarily injured eye.

You will note that enucleation is the only procedure spoken of in these rules. Evisceration, with or without implantation of balls of glass, gold or bone or masses of fat should not be considered when there is danger of sympathetic ophthalmitis or where sympathetic irritation is already present.

If enucleation is not done soon after injury, some form of foreign protein therapy should be used in most cases. For this purpose, whole milk and typhoid vaccine seem to give the best reactions. We are for the most part using typhoid vaccine, intravenously, giving as an initial dose 20 to 30 million organisms in adults, with correspondingly smaller amounts for children. Infants are never given the vaccine.

In accidents where the iris is prolapsed, it is drawn out slightly further and excised, after cleansing the eye. An effort should then be made to replace the iris through the wound with a small spatula, such as that used for the same purpose following cataract extraction. Some ophthalmologists make it a practice to touch the prolapsed portion of the iris with the electrocautery. In most cases, atropine should be used. With marginal wounds, it has always been advocated to use eserin to draw the iris away from the wound, and this may be tried, though it is rarely effective, and should be followed by atropine to put the eye at rest as completely as possible.

In the more extensive wounds, a sliding flap of conjunctiva, such as the Kuhnt flap, should be made to completely cover the opening in the cornea. It is rarely necessary to suture the cornea itself, though this may be done satisfactorily. Care must be exercised in doing this, as well as in suturing the sclera. Exerting pressure in setting sutures in the dense tissues of the cornea or sclera obviously would cause vitreous prolapse and defeat our efforts to get as nearly normal an eyeball as possible. When the eye is relatively soft, even with gaping scleral wounds, approximation of the edges may be obtained without direct suturing of the sclera, by overlapping conjunctival flaps, using mattress sutures. It would seem that, where there is such an extensive gaping that corneal or scleral sutures are necessary, the eye is usually lost and enucleation indicated.

Books have been written on ocular injuries, and there are many important phases of this subject which we might consider with profit if time permitted. It is hoped that what we have said may have some value.

OVER 5000 MANTOUX TESTS IN POLK AND NORMAN COUNTIES*

W. G. PARADIS, M.D.

Crookston, Minnesota

THE control of tuberculosis is entering a new phase based on scientific investigation and statistical information. Public health educational campaigns have characterized the past twenty years. The profession and the public have sought to control tuberculosis by stressing the importance of fresh air, good food, sufficient rest; by emphasizing the importance of a persistent cough, loss of weight, and night sweats; by ultimately placing the bedridden, advanced tuberculous patient in the sanatorium. It is now recognized that these symptoms more often indicate a rather advanced disease. However, credit to this effort must be given in accomplishing the 50 per cent decline in the death rate from tuberculosis since 1910.

Today a new approach to the problem of tuberculosis has been developed. The tuberculin skin

*Read at the annual meeting of the Minnesota State Medical Association, Rochester, Minnesota, May 23, 1933.

test is one of the most accurate tests ever discovered in the field of medicine. In from ten days to three weeks, or sometimes longer, following the first infection with the tubercle bacillus, the body becomes supersensitive or allergic to the tuberculo-protein. It has been further established that 90 to 95 per cent of all infections from tuberculosis occur first in the lungs, and therefore a relatively high percentage of these first infections may be seen by the x-ray of the chest.

These two methods, the tuberculin skin test and the x-ray of the chest, extensively applied to large numbers, give a definite approach to the problem of detection of new cases and control of sources of infection.

Not many years ago it appeared that the majority of children were infected with tuberculosis by the age of puberty. More recently Meyers reported that less than 50 per cent of children in Minneapolis had such infection. A survey made by Slater in rural communities in southern Minnesota showed positive reaction in 10 per cent of a smaller series. In my own experience 305 Mantoux tests were given to adults with only 155 or 51 per cent reacting positively. This is a small group, but it gives some idea of the incidence of infection in an older group.

To add to this knowledge, and to promote further control of tuberculosis in northwestern Minnesota in the sanatorium district of Polk and Norman counties, comprising a population of 50,079 people living under essentially rural conditions, Mantoux tests have been given to 5,332 school children up to January 1, 1933. This represents 10 per cent of the entire population and 45 per cent of the total school enrollment of 11,682 in the two counties. X-rays of the chest were made on 783 of the 801 children showing a positive reaction.

Through the courtesy of Dr. Leo Rigler, Professor of Roentgenology at the University of Minnesota, all the x-rays were read by him in order to get an unbiased opinion from a qualified roentgenologist. Of the 537 children who reacted positively to O.T., 108 (20.1 per cent) had positive x-ray findings, while of 246 who reacted positively to M.A.-100, 67 (27.2 per cent) showed positive x-ray findings—an average of 22.3 per cent.

Polk and Norman counties comprise 2,863 square miles. Seventy-five of the 7,069 children approached consented to have the Mantoux test performed. Fifteen per cent of those tested reacted positively. In Norman County, where all of the town schools and practically all of the rural schools were tested, we found that 8.5 per cent reacted positively in rural or country schools and 11.6 per cent in town schools. In Polk County, where only city and town schools were done, 18.4 per cent reacted positively.

Polk County has an incidence of tuberculosis almost identical with that of the state (1.5 per cent for the state and 1.58 per cent for Polk County). However, Norman County runs definitely lower, it being only .8 per cent. Norman County is almost entirely rural, the largest community having a population of about 1,200.

These figures tend to show that the percentage of positive reactors gives a rather accurate indication of the incidence of tuberculosis in a given community. No doubt the indication would be more accurate if all the children were tested, for doubtless some refusals are due to known exposure and the fear of the stigma of having had tuberculosis in the family.

The Mantoux test, whether done with Koch's O.T. or with M.A.-100, is not 100 per cent accurate, but it is certainly a very accurate test. We find families where some of the children react and others do not. Most of the time, this discrepancy can be explained by an accurate history. In others it is possible that the individual is not allergic.

Physical examination is of no value in detecting childhood tuberculosis. The Mantoux test and the x-ray are the means of diagnosing childhood tuberculosis. Clinical symptoms, when present, are, however, of very definite value.

Sometimes physicians oppose group Mantoux testing and x-raying of positive reactors on the theory that this type of work takes away some of their practice. The physicians in my sanatorium district have for the most part coöperated with me in my work, and those who were apprehensive regarding my Mantoux testing because of the above assumption soon learned that the amount of work that they did as a result increased rather than decreased. This is because of the fact that the general public is more apt to take advice from one who has no monetary interest in their children than from one who is interested only in recommending that the child see his family physician for other conditions than tuberculosis. It therefore follows that the sana-

torium physician should not infringe on general practice but that he coöperate with the family physician, giving him necessary information.

There is a splendid feeling and sense of cooperation between physicians in my sanatorium district and myself. We who are in sanatorium work feel that we are a part of the medical fraternity in our community and want to be treated as such by other men working towards the same goal: the alleviation of human misery and suffering.

We have also compiled a summary of all the people employed in the sanatorium since its opening, in regard to tuberculosis, which is very interesting because of the fact that we hear so much from authorities in the field of tuberculosis giving conflicting statements. One theory advanced is that a person who reacts negatively should not work in a sanatorium because of the danger of becoming infected or allergic. Another is that an individual who reacts positively should not work in a sanatorium because of the danger of acquiring an adult or secondary infection, which is dangerous. We might conclude from such statements that no one should work in a sanatorium. Of course, this creates an impossible situation.

Our figures show the following results: Three hundred thirty-five people have been employed in Sunnyrest Sanatorium over a period of seventeen years. The total number developing and breaking down with tuberculosis is eight, or 2.4 per cent. The total number developing tuberculosis, exclusive of ex-patients or those having positive family histories or positive x-ray findings when beginning work at the sanatorium, is two, or .59 per cent. The number of deaths from tuberculosis, including ex-patients and those with positive family histories, is four, or 1.2 per cent, as compared to 1.1 per cent for the general population of the state. Over a period of seventeen years the number of deaths occurring among this group who had no positive family history or no x-ray findings is 0. This is not a large series, but it represents a period of seventeen years and most certainly indicates that the sanatorium is not a dangerous place to work in. This shows that, whether a person has a negative or a positive Mantoux test, the working in a well-regulated sanatorium is as safe as any other occupation and probably safer than other public places.

Contrast this with a group of twenty-six adults with an average age of eighteen years closely associated in an educational institution where the incidence of tuberculosis was 34.6 per cent. I have been following this group for some time and expect to obtain complete histories, physical examinations and the Mantoux reports. The incidence in this group is high because of the fact that there was one proved source of infection, and probably two, in the institution. Two of this group are now dead, but the apparent original source of infection is still living. Her brother recently died of a miliary tuberculosis.

This paper is based on the facts as I have found them in my sanatorium district and therefore very little reference is made to the work of other men.

The problem of the further control of tuberculosis has passed beyond the stage of Public Health Educational Campaigns. If tuberculosis comes from tuberculosis, then our purpose must be to make an early diagnosis and follow this up with a search for the source of infection. The future policy of the control of tuberculosis must be along the lines of the following program:

1. Obtain the interest and coöperation of doctors and nurses.
2. Overcome the prejudice and misunderstanding of the public.
3. Apply the Mantoux test on all school children where consent can be obtained.
4. X-ray all children who react positively.
5. Find the source of infection in each case by special investigation.
6. Remove all those with active tuberculosis to a sanatorium for isolation and treatment.

An increasingly rapid decline in the death rate from tuberculosis can be anticipated by such a program.

Conclusions

1. Mantoux testing is of decided value in locating sources of infection.

2. The Mantoux test is one of the most accurate tests that we have in the field of clinical medicine.

3. Working in a tuberculosis sanatorium is no more dangerous than working among the general public.

4. Adults may easily contract tuberculosis when associated with an individual with active tuberculosis.

5. Follow-up work keeps the physician and general public alert and is very educationl.

6. The general public will realize the danger of keeping one with active tuberculosis at home only by positive education on the part of the private physician as well as the sanatorium physician.

7. The stigma associated with tuberculosis is disappearing in our sanatorium district because of the educational work done among our people by our physicians and nurses through clinic work and especially through the Mantoux testing of school children.

CASE REPORTS

ESOPHAGOBRONCHIAL FISTULA FROM A FOREIGN BODY IN THE LEFT BRONCHUS*

PORTER P. VINSON, M.D.
Rochester, Minnesota

Pulmonary infection almost always follows lodgment of a foreign body in the tracheobronchial tree. Immediately after aspiration of the foreign body, this infection may be acute and may lead to pneumonia or pleurisy with effusion, or, if the infection is present for a prolonged period, abscess or chronic bronchiectasis may develop.

Prompt recovery, with restoration of the pulmonary tissues to normal, almost always follows if the foreign body is removed immediately after it has been aspirated. Even when the body has been present in the bronchus for many months or years, its removal, together with bronchoscopic aspiration of the associated abscess, and dilatation of the accompanying bronchial stricture, usually results in complete recovery.

The following case is reported because of the unusual occurrence of ulceration into the esophagus, caused by the foreign body, with formation of an esophagobronchial fistula; removal of the foreign body produced an increase of symptoms rather than symptomatic improvement.

Case Report

A boy, while playing with an older sister, when he was six months of age, had choked and coughed. Because the sister had had a few harness rivets in her hand at that time, the mother thought that one of them might have dropped into the patient's mouth. A physician was consulted but he felt that the child had not swallowed or aspirated a foreign body, and a roentgenographic examination was not considered necessary. As the child became older, he had many respiratory infections, and, following a particularly severe infection at fourteen years of age, pleurisy with effusion was suspected. Roentgenographic examination was made and a foreign body was seen in the region of the left main bronchus. The mother immediately identified the foreign body as the harness rivet that had been aspirated when the patient was a baby. A competent bronchoscopist was consulted and he removed the foreign body without difficulty. Instead of the usual cessation or diminution in symptoms following this procedure, the cough and expectoration became more pronounced and the patient found that swallowing liquids was almost always accompanied by strangulation. This was especially noted if the fluid was taken rapidly. Solid foods did not produce any disagreeable symptoms.

It was because of the strangulation on swallowing that the boy came to The Mayo Clinic, October 14, 1933. At that time he was sixteen years of age. Roentgenoscopic examination was made, and when the patient swallowed a suspension of barium a portion of it was seen to enter the left main bronchus and was then promptly coughed out of the air passages. Esophagoscopic and bronchoscopic examinations were both declined. As the patient was reasonably comfortable, he did not wish to consider surgical closure of the opening in the esophagus and bronchus.

*From the Division of Medicine, The Mayo Clinic, Rochester, Minnesota.

CONGENITAL SOLITARY KIDNEY

RICHARD B. HULLSIEK, M.D.
Saint Paul

The term congenital solitary kidney implies the complete absence of one kidney and is not to be confused with renal hypoplasias and fusion anomalies. A review of available records indicates that most of our data concerning single kidney have come from autopsy reports.

In 1895 Ballowitz collected 213 cases from the literature; twelve in 28,423 autopsies, an average of one case in 2,400. Anders added seventy-three cases in 1910. His statistics show that these kidneys are especially prone to pathologic change, as out of 170 cases seventy-nine showed changes other than hypertrophy.

Since 1910 numerous other authors have added cases so that in his review of the literature in 1924 Goldstein found 349 cases. He added sixteen not collected by previous authors and included two personal cases.

In 1929 Hennessey analyzed twenty-three additional cases and added a case report, bringing the available records to 373 cases.

Single kidney is often associated with other congenital malformations of the genital tract. Of 135 cases in which the condition was mentioned, Anders found ninety-four which showed changes in the genitalia.

Complete absence of all or a portion of the upper urinary tract on one side is due to a failure or faulty development of the ureteral bud and always results in a compensatory hypertrophy in the single kidney, with enlargement of the renal pelvis, which is not nearly so marked in those cases of compensatory hypertrophy acquired later in life.

One may encounter any of a variety of combinations in cases of solitary kidney, *i.e.*, complete absence of kidney, ureter and ureteric orifice on one side, with the ureter from the single kidney having its bladder orifice on the same or opposite side. The kidney alone may be absent, with a full length but more often a short rudimentary ureter ending in a normally placed and developed ureteral orifice. It is in this latter group that one is likely to assume the presence of a normal kidney on each side after simple cystoscopy.

The kidney may be situated in its normal position, over the spine, in the iliac fossa, or in the true pelvis. The vesical trigone may be symmetric with two normal appearing ureteral orifices or one orifice with a few vessels to mark the location of the absent orifice; or it may be asymmetric with the inter-ureteric ridge fading into the bladder near the midline.

The following case is one which from a clinical viewpoint must be considered as a congenital solitary kidney; and although this diagnosis has not been verified by operation or autopsy, sufficient evidence has been found to report it as such.

Case Report

C. R. L., a white man, aged 49, a carpenter, was seen May 2, 1931, complaining of pain in the right side of his abdomen. The pain began one week previous and was preceded by nausea and one vomiting spell. It was constant in character in the right upper abdomen and the region of the right costo-vertebral angle, referred later to the right testicle.

Past history: He had had smallpox at age of twenty-four. There was a history of pain in right side of abdomen in 1904, which was diagnosed as appendicitis, but no operation was performed. At that time he remained in the hospital eleven days and there has been no recurrence of this pain until the present illness.

Physical examination. Except for the presence of a tender palpable mass in the right flank and abdomen, examination was negative. The temperature was 98.6°, pulse 70, respirations 20, blood pressure 140/76. Urinalysis: s. g. 1014, albumin faint trace, sugar negative, microscopic, r.b.c. 1 to 4, and pus cells 5 to 10 per high power field. Blood examination: Hemoglobin 75 per cent, erythrocytes 4,380,000, leukocytes 9,350; differential, neutrophiles 68 per cent, lymphocytes 27 per cent, monocytes 2 per cent, eosinophiles 2 per cent, basophiles 1 per cent; Wassermann negative. Blood chemistry, sugar 78 mgms., creatinin 1.6 mgms., urea nitrogen 40.7 mgms.

Cystoscopy: The external genitalia were normal. Bladder capacity and contour were normal. The right margin of the trigone was slightly elevated, the right ureteral orifice normally located and showed occasional contractions. The interureteric ridge was normal as it left the right orifice but disappeared in the bladder wall near the midline. There was no sign of any left ureteral orifice in the usual location. The entire left half of the trigone appeared to be absent. Indigo-carmine given intravenously failed as an aid in finding a left ureteral orifice either in the bladder or prostatic urethra. No trace of the dye was seen at the right orifice in ten minutes, although activity was observed in the form of contractions of the orifice.

A number 5 F. ureteral catheter was passed 25 cms. on the right side and immediately a steady dropping of blue tinged urine was seen. One hundred and twenty-five cubic centimeters of indigo-carmine tinged urine was then aspirated.

Fig. 1.

Injection of sodium iodide was then commenced and when 35 c.c. had been injected the patient complained of a feeling of fulness in the right side of the abdomen, so the injection was stopped and a urogram made.

The iodide was then aspirated. The urine from this kidney on analysis, showed: Albumin, trace; pus cells 3 per high power field. Smears showed no bacteria; culture no growth. The urogram (Fig. 1) showed evidence of pyelectasis due to uretero-pelvic junction obstruction in a markedly enlarged right kidney and pelvis. There was no evidence of a shadow denoting the presence of a left kidney. Subsequent urograms made by the intravenous method also failed to disclose any evidence of renal tissue on the left side.

The catheter was left *in situ* for drainage. No reaction followed the cystoscopy. The symptoms complained of were relieved by drainage with the inlying ureteral catheter.

May 8 the blood chemistry showed: sugar 95 mgms., creatinin 3.3 mgms., urea nitrogen 49.1 mgms.

May 15 the blood urea nitrogen was 33.6 mgms., and phenosulphonphthalein first hour 200 c.c., 25 per cent, second hour 165 c.c., 14 per cent.

May 20 the blood urea nitrogen was 23.4 mgms.

May 25 the patient was discharged from the hospital.

An intramuscular phenolsulphonphthalein on June 3 showed a 55 per cent excretion in two hours.

This patient is free of symptoms and has good renal function at the present date.

1360 LOWRY MEDICAL ARTS BUILDING.

METHYLENE BLUE IN THE TREATMENT OF CARBON TETRACHLORIDE POISONING

Preliminary Report Of Three Cases

ROBERT LYMAN NELSON, M.D.
Duluth

A search through the literature has failed to disclose the use of methylene blue, or methylthionine chloride, in the treatment of carbon tetrachloride poisoning. The following cases are presented in the hope that further observations may determine its actual value.

No explanation of the possible physical or physiological effects of the drug is offered. Its action in carbon monoxide poisoning is controversial, especially from the laboratory side. It is even more so in relation to cyanide poisoning. Especially in the former, the clinical effects have caused it to be widely used.

As to my reason for using it, I can offer no feasible explanation except, perhaps, the symptom association which I have noted in the less acute carbon monoxide intoxications.

Case Reports

Case 1.—March 26, 1934, R. O., a woman aged forty-two, floorlady at a dry-cleaning plant, presented herself with primary complaints of continued nausea and vomiting when she came in contact with carbon tetrachloride fumes. These had been increasing in intensity for the past month and especially so the past week. She was losing weight, was very irritable and stated that she could neither eat nor sleep, but these symptoms tended to diminish when she was away from the plant.

General examination was essentially negative. Distressing climacteric phenomena were at first suspected but given less importance on continued questioning.

Fifty c.c. of 1 per cent solution of methylene blue were injected intravenously and she was given 1½ gr. of phenobarbital to take on arriving home. She was also given an alkaline bismuth powder to use at hourly intervals for about six doses.

The immediate reaction was one of mild shock with a feeling of weakness and general perspiration and sensation of numbness in the arms and legs. This disappeared in about twenty minutes, at which time she felt quite able to go home unassisted. On the following day she felt a little tired, but nausea had disappeared and on the day afterward she felt quite normal. Nausea and vomiting, weakness and irritability had disappeared. She continued to work every day under essentially the same conditions as before. This improvement lasted for about two weeks, at which time she again started to show some of the same symptoms in a milder degree. She has had no repetition of the original treatment nor any other treatment.

Case 2.—On March 28, 1934, W. F., a male aged twenty-nine, cleaner in the same dry-cleaning plant, called me to ask if he could get the same treatment that his co-worker had received. For two months he had been noticing an increasing susceptibility to the fumes of carbon tetrachloride. This was manifested by a feeling of weakness, nausea, anorexia and insomnia. The nausea was becoming troublesome in his work. All symptoms tended to diminish over week-ends when he was away from his work. At his request the same procedure as employed in Case 1 was duplicated with almost identical results, *i.e.*, initial mild shock symptoms and sensation of numbness in the extremities disappearing in about fifteen minutes, after which time he went to his home unassisted and returned to work the following morning. Up to the present time (five weeks later) he has had no recurrence of his symptoms.

Case 3.—On March 31, 1934, M. D., a male aged twenty-nine, called me on the telephone to ask if he could take "the cure." He explained that he meant the treatment which had been so dramatic as to justify the use of the term. He, too, presented essentially the same complaints as the others, being exposed to the same fumes in the same plant in which there had been a distinctly troublesome and temperamental ventilating system. The same treatment was here administered with the same result for the first two weeks. Following that a gradual reappearance of the sensitivity to the fumes again appeared, though in much milder degree.

Summary

Three cases are presented in which a very definite history of exposure and susceptibility to carbon tetrachloride fumes allowed a presumptive diagnosis of carbon tetrachloride poisoning. All three cases showed nausea, anorexia, weakness and insomnia. Nausea and irritability were exaggerated by exposure to the fumes in all three cases. The same treatment was employed in all three cases. In Cases 1 and 3 a single administration of methylene blue was followed by a cessation of all symptoms for two weeks. In Case 2 symptoms are still absent five weeks later. The duration of the symptoms was one month, two months, and one year, respectively. In Case 3 no previous attempts at eliminating the symptoms complained of had been satisfactory with the single exception of absence from exposure. The first two cases had had no previous treatment.

Obviously, these three cases do not justify any satisfactory conclusions, nor is there any attempt to account for the results obtained.

HORLICK'S MALTED MILK ACCEPTANCE WITHDRAWN

The Committee on Foods reports that the container label and advertising for Horlick's Malted Milk present explicit infant feeding formulas for infants aged from 1 week to 12 months. The manufacturer, Horlick's Malted Milk Corporation, was informed that the promulgation of feeding formulas in lay advertising is considered to be in conflict with the best experience, authoritative judgment and basic principles in infant feeding, and that the feeding of an infant by routine feeding formulas and instructions distributed by food manufacturers, or according to directions, printed materials, or advice of any person other than the attending physician, may seriously endanger the health of the infant. The manufacturer expressed himself as unwilling to remove the feeding formulas from advertising addressed to the public for merchandising reasons. The acceptance of Horlick's Malted Milk is withdrawn and the product will no longer be listed among the Committee's accepted foods. (*Jour. A. M. A.*, April 15, 1933, p. 1175.)

EDITORIAL

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BUSINESS MANAGER
J. R. BRUCE, Saint Paul

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Alpha Dinitrophenol

The numerous references in the literature the past year to dinitrophenol as a weight reducer and the appearance of the drug on the market in recent months have led to a considerable amount of clinical trial and a noticeable difference of medical opinion regarding its use.

The toxic effects of the drug on munitions workers during the World War, which included loss of weight, led Tainter and his collaborators at Stanford University to study the drug and its effects on metabolism. It was found to increase metabolism in animals, although not a substitute for thyroid in cases of thyroid deficiency and, if given in toxic doses, produced pyrexia and death from circulatory failure.

The reports of Tainter and his associates indicate briefly that the drug increases the cellular metabolism of fat and carbohydrate not disturbing the nitrogen balance, throws more glycogen from the liver and muscles into the circulation and in moderate doses produces no demonstrable damage to any of the organs.

Small doses of 3 to 6 milligrams per kilo of body weight, according to the author, produced an increase in basal metabolism of 20 to 30 per cent without effect on the pulse or respiratory rates or the blood pressure, and a gradual loss of two to three pounds in body weight per week. Larger doses of 5 to 10 milligrams per kilo were accompanied by sweating, increase in pulse and respiratory rate and more rapid loss of weight. Doses over 10 milligrams produced more toxic symptoms of apprehension, fever, sweating, rapid pulse and respiration and air hunger.

Deaths from large doses have been reported in two cases preceded by pyrexia and circulatory failure.

From the trial of the drug so far it seems that a valuable addition has been made to our armamentarium. This statement is made with some reservations and the warning that perhaps a greater percentage of individuals have an idiosyncrasy to the drug as manifest by the development of toxic symptoms, especially skin rashes, than is true of many other drugs. Certainly the physician should direct the use of the drug and it should not be sold directly to the public, as at present it is. Its administration should be begun with small doses of a grain and a half a day, cautiously raised until the patient shows a slight loss of weight and only rarely increased above four and a half grains per day in divided doses. If the patient is warned against the appearance of toxic symptoms and the drug is not continued for more than two or three months, it is not likely that serious harm can result. Diabetes should be a contra-indication while hypertension is apparently not aggravated.

Dinitrophenol apparently has distinct advantages over thyroid medication as a weight reducer. While doubtless most patients will still have to curb their appetites and not place sole dependence on the drug, weight is lost even on doses not sufficient to produce toxic symptoms. In certain instances where thyroid medication is not successful or is contra-indicated, dinitrophenol has been successfully used.

With the further warning that proof of the non-cumulative action of the drug has so far not been reported and therefore the drug should not be administered indefinitely, the subject may for the time being be dismissed.

Artificial Pneumothorax in Pneumonia

One of the most startling suggestions in the realm of therapeusis is that of inducing pneumothorax for the treatment of lobar pneumonia. As in the case of other proposed methods it seems that this treatment is not entirely new, for the literature contains the report of a total of fifty cases of pneumonia so treated since 1921, with only three deaths. No cases apparently have been reported in American literature. The writers, without exception, have been enthusiastic about the results.

In an effort to evaluate the procedure experimentally, Lieberman and Leopold* artificially produced lobar pneumonia in thirty-six dogs and treated half of them by producing artificial pneumothorax on the consolidated side, the other half having been used as controls. Fifteen of the eighteen dogs treated by pneumothorax recovered, whereas only five of the controls survived. Some 400 c.c. of air was injected on the affected side two days following the installation of virulent pneumococci in starch broth and was repeated the following day. Each injection was followed as a rule by prompt improvement of symptoms resembling a true crisis, as occurred in the clinical cases reported.

No attempt was made by the authors cited to explain the *modus operandi* of the treatment. Air in the pleural cavity on the affected side might well separate visceral and parietal pleural surfaces if given early in the disease and thus tend to relieve pain and lessen irritation from respiratory movement in a consolidated lung. On the other hand one might expect a diminution of tidal air in the uninvolved lung on the same side —a result not particularly desirable.

Certainly the authors are conservative in their suggestion of the clinical application of this method of treatment. They are emphatic in their assertions that the treatment is not universally applicable and they warn that too much air will embarrass the opposite lung by mediastinal displacement. They further emphasize, and rightly, that the pneumonia patient is not a fit subject upon whom to learn the technic of artificial pneumothorax.

We shall await with considerable interest the report of the clinical trial of this new method which these authors are to publish soon.

*Lieberman, Louis M., and Leopold, Simon S.: Therapeutic pneumothorax in experimental lobar pneumonia in dogs. Am. Jour. Med. Sci., 187:315 (March), 1934.

COMMUNICATIONS

To the Editor:

In the March, 1933, issue of MINNESOTA MEDICINE I reported a case of diverticulum of the gallbladder. After looking up the literature on this subject I found that only fifteen such cases had been reported up to this date, with only six from our country. Such being the case I have another to report, thus making a total of seven in this country.

On December 27, 1933, I was called to see a patient who was having a typical gallbladder colic and treated him accordingly. He was forty-eight years of age, single and had lived in this country nine years. He was brought to the hospital and treated medically until December 29, at which time operation was indicated.

Spinal anesthesia was used, an upper right rectus incision was made, a few adhesions about the gallbladder were freed and I could see that the gallbladder was in a condition that rupture might take place very easily. The serous lining over the fundus was very thin, beneath it being a stone 1.5 inches in length and 0.5 inch in thickness. In the cavity proper was a stone of similar size. The gallbladder was removed and a rubber drain was inserted laterally. Everything went along nicely for two weeks, at which time an abscess developed in the rectum, but after that was opened and drained for two days, healing took place and no other complication occurred.

I sent this specimen as well as that from the other case to the pathology department at the University of Minnesota, where Dr. E. T. Bell examined them, and reported both to be true diverticula.

A. L. PERTL, M.D.

BACTERIOPHAGE THERAPY

The early hopes of bacteriophage therapy have hardly been realized. In spite of much experimentation, which has shown why bacteriophage could not function therapeutically, at least as a specific agent pitted against a specific infection, clinical observations have been accumulating which indicate that intravenous injection of bacteriophage may have beneficial effects. The material labeled "bacteriophage" which the clinician injects into a patient with severe septicemia is obtained by first growing the particular bacterium on a broth medium and then introducing bacteriophage into the turbid culture. After further incubation the material becomes entirely clear, showing that the bacteria have been dissolved and killed by the bacteriophage, the concentration of which has increased sufficiently to cause bacterial disintegration. Obviously, such a bacteriophage solution is not a simple solution or suspension of bacteriophage. These disintegrated cultures of bacteria may therefore be considered supervaccines containing all the chemical constituents of the bacteria. Larkum has advocated, in general, the use of lysed bacterial cultures instead of the ordinary vaccine as being much more effective. Though the use of bacteriophage as a specific agent has been disappointing, it may yet yield important results by showing how more effective vaccines may be prepared. (*Jour. A. M. A.*, May 6, 1933, p. 1431.)

MEDICAL ECONOMICS

Home For Cripples

Is sickness insurance working out well in Germany? In England? Denmark? France? Austria?

Proponents of health insurance in the United States frequently circulate glowing reports of the increase in available medical service, the individual security, the generally rosy outlook for the health of Europe as a result of their systems of sickness insurance.

Less glowing reports are to be found, however, by any impartial student of the matter who wishes to take the trouble to hunt for them in current literature.

Following is an excerpt from an article by a German physician, Dr. M. Kirschner, Zur Praxis der Begutactung. It should be of interest to Americans to whom a system of medical care similarly supported by regular payments from all has been held out as the solution of all our difficulties.

Dr. Kirschner says:

"The insured also believe, since they have long contributed to the cost of insurance, that after a certain time *they have a right* to receive some money from it, and only a few workers realize that the existence of an insurance system depends on regular payments from all in order that the individual, as an exception, may obtain something. It is easy to implant the idea in the consciousness of a simple man: 'Now that I have paid so long, I will at last get something out of my insurance.'

"The fact that demands for damages and for raising the rate of payment are practically unlimited and cost the insured nothing to bring, and that, if denied, decisions of higher officials may be demanded *without cost or danger,* creates covetousness, quarrelsomeness and simulation; one can at least try everything, and try to drag out a little more; trying costs nothing.

"In this way the *ominous will to be sick* is artificially created, and social institutions are many times practically compelled to put a premium on sickness, laziness, exaggeration and deceit, so that the individual, who is in a manner the innocent victim of these compulsory institutions, cannot make any special individual objection. Since legal compulsion has today brought the majority of the population within the scope of social insurance, a constantly increasing proportion of the workers is brought into a condition of subjection to these institutions. Present-day Germany has been compared to a great *Lazaret,* or *home for cripples,* where each individual is trying to get as much as possible out of the gigantic pension cup, which is kept filled by ever higher contributions. Every seventh German is today a social pensioner."

Noblesse Oblige

The Minnesota plan for medical care of government relief wards is proving expensive according to F. M. Rarig, Jr., executive secretary of the State Emergency Relief Administration, and Benjamin E. Youngdahl, director of the Division of Relief.

These two state officials made this important declaration at a luncheon meeting called recently by Dr. N. O. Pearce, Minneapolis, chairman of the state medical committee that assisted in formulating the plan last fall.

Two principal sources of expense were cited by them as calling for some alteration.

One was mileage costs; reduction of these bills by restricting patients to a choice of physicians within easy reach was advised and is now a virtual certainty.

The other involved medical over-charging, including such items as unnecessary house calls.

Bills Seem Large

Some of the bills presented for medical service seem to the State Relief Administration to be too large. On the surface, at least, it would seem that minor operations assume major proportions in the mind of the operator, when he is making out a bill to submit to the administrator of government funds. The same applies to some forms of obstetrical practice.

In many cases, to be sure, considerable specific detail must accompany the bill if the relief administrator is to understand its justice. Often the county relief agent should be given personal and complete information in the first place.

In any case, the status of the patient and the amount of money he might be expected to pay under normal circumstances should be considered in making charges —not the fact that government money is available under the medical relief plan, to pay his bills.

Will Investigate

The State Medical Association has requested full information from the Relief Administration as to the actual amount of money spent in each county on relief for medical care, medicines and nursing care. Also the total amount spent in the same counties through Federal Emergency Relief for the general relief of the poor. With these figures, the Association hopes to be in a position to assist in investigating the justice of Relief Administration charges. Another meeting with these officials will be arranged as soon as such a study has been made.

The seriousness of the matter was not minimized by the medical committee. The members pointed out, how-

ever, that over a period of some ten months in which the medical relief plan has been operating in Minnesota only one complaint had been brought to their attention —that of a non-member physician who had allegedly failed to give a proper examination for two transient camp members.

The fact that any significant amount of over-charging had occurred came as a complete surprise to the medical association officials.

Depends On Physicians

Obviously, the success of the plan as it was originally outlined, depended to a considerable extent upon the physicians.

If the physician took advantage of the plan to make unnecessary calls there was no one who could say to him with any authority: "That was an unnecessary service."

Members of the Minnesota State Medical Association who are caring for relief patients are under a special obligation to watch their charges closely; to avoid any slight suspicion of "chiselling" even though their charges fall within the letter of the regulations.

The amount of money available for relief in Minnesota is strictly limited. There is no bottomless sock from which anyone can draw to the limit of the regulations for food, clothing, shelter or medical care for the unfortunate. If the doctors, for example, should use too much, it would mean that somebody might go hungry.

Offer Assistance

The Council, the officers and committee chairmen of the Minnesota State Medical Association offer every assistance in their power to the State Emergency Relief Administration, to see that the poor have good care, and charges are not exorbitant, as well as to see that doctors are treated fairly.

Members of the association who have any complaint on their own part to make about the operation of the plan or who want information on regulations are asked to write to state headquarters, 11 West Summit Ave., Saint Paul, immediately.

Summer Round-Up

The 1934 Summer Round-Up of the Children conducted by Parent-Teacher Associations is now under way in Minnesota.

No doubt thousands of children will be benefited by it and the benefit will be in direct proportion to the educational effort that is directed toward thorough examinations by and regular consultations with the family physician.

There is no doubt, also, that differences will arise between physicians' organizations and the enthusiastic and, occasionally, misguided officials of the movement.

When the campaign has run into difficulties and produced contention, the fault usually appears to have been failure on both sides to understand and carry out the real objective of the movement.

The first paragraph of the leaflet entitled "The Summer Round-Up of the Children, 1934 Plan of Procedure" which was sent to all Summer Round-Up chairmen, admirably defines that objective.

Objective

"The Summer Round-Up of the Children is a campaign to send to the entering grade of school or kindergarten a class of children as free as possible from remediable defects. The ultimate goal is to educate parents to the need for early periodic examination of their children by the family physician and dentist in order to insure correction of hampering defects which might not otherwise be discovered until the child enters school."

It is, of course, with the schemes for carrying out this objective that physicians have sometimes quarreled —not with the objective itself.

Where the superficial, unsatisfactory mass examination of children is held to be a complete realization of Summer Round-Up objectives, physicians' organizations have rightly complained.

These legitimate complaints should not, on any account, take the form of indignant withdrawal of all official interest and assistance in the movement, however.

That course of action has unfortunately been tried. Result: Misunderstanding and indignation on the part of thousands of honest and well-meaning members of parent-teacher organizations; continuance of Summer Round-Up programs with objectionable features emphasized rather than removed as a result of medical society action; general public misunderstanding of the medical point of view.

The policy of the American Medical Association, which serves with the other national organizations as a member of the advisory committee to the Summer Round-Up, is one of friendly coöperation and assistance.

Friendly Medical Advice

The American Medical Association goes further than that. It provides most of the examination blanks used for recording physical findings in Round-Up examinations. But it keeps the emphasis in all instruction that goes out from national headquarters on the real objective of the movement. It assists by friendly advice and coöperation to remove as far as possible, from a national standpoint, the objectionable phases of the program.

Keeping always before the Parent-Teacher groups that they are working, not toward an ideal to be expressed in any number of children examined in a given time, but toward more children adequately and regularly cared for by their family physicians, the American Medical Association in its House of Delegates has repeatedly endorsed the Summer Round-Up movement.

Minnesota Policy

The Minnesota State Medical Association took a similar stand in 1930 when its House of Delegates accepted as a statement of its policy a letter written by Dr. S. H. Boyer of Duluth, then president of the State Association, to Mrs. A. A. Mendenhall, also of Duluth

and at that time president of the Minnesota Congress of Parents and Teachers. This is the letter:

March 12, 1934

Mrs. A. A. Mendenhall, President
Minnesota State Parent-Teachers Association
1528 Jefferson Street
Duluth, Minnesota
In re: Summer Round-Up of Children of Pre-School Age.
Dear Mrs. Mendenhall:

Answering the request of the Parent-Teachers Association for endorsement of the above mentioned movement by the Minnesota State Medical Society:

First: The Minnesota State Medical Society is in sympathy with anything tending to promote either public or private health or both.

Second: We are not in favor of health examinations *en masse*, inasmuch as we believe this method to be wasteful of time, inefficient in process and therefore faulty in its final diagnostic conclusions and advice as to treatment.

Third: We believe that physicians lending their aid to this activity should render thoroughly good service and receive commensurate compensation for their work.

Fourth: It is our belief that, in the prosecution of this work, the parents and guardians of children about to enter school should be encouraged to have their children examined by physicians of their own choice (preferably their family physician) and at their own expense. The children of those who for any reason are unable to meet their financial obligations should be examined by one or another of the free agencies.

Fifth: We recognize that in some few localities, owing entirely to local conditions, the examination must be conducted at public expense.

Taking the above provisions into consideration and believing that your association will not be unmindful of them in carrying on your work, the Minnesota State Medical Association whole-heartedly endorses the movement and assures you of its genuine coöperation.

Very respectfully yours,
S. H. Boyer, M.D., *President.*

Medical men should remember that there are more than 40,000 members of Parent-Teachers associations among Minnesota mothers and fathers alone. That figure does not take into account the large number of other persons who also take an active interest in the program of the organization.

All of these people believe profoundly in the worth and desirability of the Summer Round-Up program.

Physicians who may disapprove it without offering a practical plan of procedure to take its place must answer for their short-sightedness to a large and influential and well-organized group of men and women.

Misleading Travel Tales

Czarist Medicine Is Defended

As a result of economic conditions, mal-adjustment has affected various phases of our social structure and many attempts have been made, largely by theorists, to correct them. Because of its predominant status in the affairs of life, medical care has come in for its share of attention.

Theorists, with the financial support of several Foundations, have been striving in recent years to influence public opinion to demand immediate solution of medical problems. Because of economic distress, members of the medical profession have become willing to try almost anything to improve their own status. Many of the suggestions made for improvement of the present situation are based more on theory than on fact. Among these are statistics derived from so-called investigations of socialized forms of medicine abroad. Proposed methods which appear on the surface to be solutions of our problems, on careful inspection are seen to lack careful investigation and scrutiny of facts. Deductions have been made which are in some instances erroneous and misleading.

"Incredibly Better"

An example of this is a book entitled "Red Medicine," recently written by Sir Arthur Newsholme, M.D., and John Adams Kingsbury, LL.D. The authors compare the practice of medicine as existing in Russia today with that formerly existing in Czarist Russia. They are fully convinced that "for the vast majority of the total population the medical care now given in Soviet Russia is incredibly better than formerly, both in quality and availability." They infer that the socialized medicine adopted by Soviet Russia might well be applied to our own needs.

The book was recently reviewed by Henry A. Koiransky, M.D., in the *New York Times* Book Review. Dr. Koiransky finds on investigation that the book is full of fallacies and erroneous conclusions. In the first place, Messrs. Newsholme and Kingsbury required only four weeks, spent in traveling over 9,000 miles, to come to the most audacious conclusions that "what the Soviets have accomplished in their courageously original schemes for the health and social well-being of the people constitutes a challenge to other countries." He finds that much of this information was gathered from conversations with Soviet officials, although the investigators did not know the language and had to rely upon interpreters.

Communist Quality

A survey of medical facilities existing in Czarist Russia made by the reviewer shows that the alleged increase in facilities and improvement in medical care is not based upon fact. As to the quality of the Soviet medical staff, the critic writes, "We have a letter from the late Dr. L. O., a brilliant bacteriologist of one of the largest cities of Soviet Russia, and one of the many victims of post-war conditions in Russia. It is but one of others which reveal facts not without significance. A young Communist, second year medical student of the University of Kazan, is examined in physiology. The student comes from the rank of manual workers (a so-called 'vidvigenetz'). He is requested to give the composition of air. Here is the answer: '10 per cent of oxygen, 5 per cent of hydrogen, 65 per cent of nitrogen and 10 per cent of temperature.' The professor of physiology refused to pass this student, but had to submit to the order of the party official present at the examination: 'Comrade N. has to

be re-examined in a fortnight on the same subject, after re-reading and finding the correct figure!"

The reviewer concludes that the report made by Messrs. Newsholme and Kingsbury is misleading to the uninformed reader, it places the medical achievements of pre-revolutionary Russia in a false perspective, and it is not a sufficiently thoroughgoing analysis of the existing situation to merit recognition as a scientific investigation of facts.

Moral: Let us get at the real facts and results of experience before we try radical theories in Medical Practice.

Reforms for America

Speaking before the Western Hospital Association, recently, Mr. Kingsbury offered the following suggestions for America, based upon studies made by the Milbank Foundation. This foundation, it will be recalled, was one of the principal supporters of the Committee on the Costs of Medical Care and has expressed itself on several occasions as dissatisfied with the absence of tangible results from the majority report brought in by that committee.

Mr. Kingsbury now urges:

1. Compulsory sickness insurance for all families with annual incomes of less than $3,000 or, perhaps, $5,000. Medical benefits under such a scheme would fall into two classes: one to include payment of the general practitioner and, perhaps, for prescribed medicines; the other, not mandatory, to include payment for services of medical specialists, dentistry, nursing, laboratory and clinic services, etc.

Per Person $7.50

2. That the general practitioner be paid a sum equivalent, at least, to $7.50 annually for each insured person. The amount, of course, would be set by legislation. Mr. Kingsbury points out that the practitioner who serves 1,000 potential patients would receive a gross income of something like $7,500, adding that "the practitioner who serves 2,000 obviously would receive more."

3. That the total cost of insurance per person be financed 20 per cent by taxes and 80 per cent from direct contributions of insured persons, or contributions shared by employers and employes, or borne entirely by the state. The total cost per person he estimates at approximately $36 a year.

Lay Supervision

4. That there should be lay supervision for financial and executive problems.

5. That there should be professional supervision of professional personnel and problems, with a judicial agency combining lay and professional representatives to deal with complaints and grievances.

This and many other official statements definitely place the Milbank Memorial Fund of 40 Wall Street, New York City, behind a compulsory state system for the delivery of medical service. Mr. Kingsbury, in his western address, carefully refrained from any discussion of the difficulties that have been encountered in experiments with this kind of service among the poor.

His address follows, with significant closeness, upon his enthusiastic account of a comparable system in Soviet Russia.

Helping the "In-Between" Fellow

An interesting attempt to help the "in-between" fellow of small wage to pay for his own medical service is now in progress by the Medical Service Bureau of the Wayne County Medical Society of Detroit.

Results noted in the first report of the bureau, recently published, cover four months and are merely suggestive.

But medical societies everywhere will certainly read this and subsequent reports with interest, since a successful bureau of the sort organized in Wayne County would solve a good many of the current problems of medicine and solve them without recourse to insurance or group practice or third party contracts.

The purpose of the Wayne County Bureau is, in the words of the *Detroit Medical News*, "to make available to every employed person of limited means a full and complete medical service." The Bureau offers facilities so that all bills for medical, surgical and hospital care are coördinated and easily liquidated by the man or woman of small wages over a period of fifty-two weeks.

No Dues, No Fees

"This is *not* an insurance plan," declares the *News*, "No dues, no fees, no premium of any kind are charged before the medical service is rendered. It is an honest attempt to help the 'in-between' fellow and the members of his family."

"This class of patients has always been the mainstay of every business," the bulletin further points out, "and of every successful medical practice. At present, many people in this class find themselves with no cash reserve. They have jobs; they need medical attention. They do not want charity, but because they do not know what to do, many procrastinate, sometimes to their disaster."

The plan calls for coöperation with employers of labor and, to date, twenty-two large industrial employers have promised their coöperation to the extent, in some cases, of employe loans; in others, of guarantees that installments will be met; in others, of payroll deductions.

The Bureau does not set fees. It merely interviews the patient or anyone familiar with family circumstances, investigates and works out a plan for liquidating the account based on the actual financial conditions of the family. The majority of hospitals are coöperating and hospitalization is provided for on the same basis at the recommendation of the doctor.

To date, about 50 per cent of the patients handled through the Bureau have come from industrial plants, sent by employers. The rest have been sent by physicians of Detroit.

Looking for Trouble

Everybody knows what trouble there is when nursing programs are launched and carried on without medical direction. Medical men justly complain of it. Nurses' organizations deplore it.

An effort has been made by the State Board of Health, working at the behest of the State Board of Control, to avoid such trouble in the future conduct of relief programs employing nurses in Minnesota.

The employment of fifty nurses in various kinds of relief work is now under preparation by the State Board of Control. The State Board of Health recently submitted a plan for the direction of these nurses. It was designed to secure physician leadership for these programs in every community.

The proposed plan was outlined and sent to 100 committee chairmen, officers, council members of the Minnesota State Medical Association, for their study and suggestions.

The hiring and launching of these nurses waited only for approval from Washington. It might come any day.

Did the physicians who have so often and so heartily agreed that medical men should be in charge of such projects, hasten to answer this call for their assistance in a matter which intimately concerns the practice of medicine in Minnesota?

They did not. At least they did not do so in any great numbers.

After more than a month, four have now sent their comments to Chairman E. S. Boleyn, Stillwater, of the Public Health Nursing Committee.

The responsible authorities came to the State Medical Association to ask for help and leadership.

If members of the Association ignore the appeal, they will have small grounds for complaint if the conduct of these nurses does not meet with their approval later.

Good Meeting

Two successful district medical society meetings have been held this spring that may be suggestive for programs in other districts.

One was at Fergus Falls, the other at Crookston. Both were inter-professional meetings with clergymen, dentists, nurses and druggists invited to dinner. A popular dinner speaker talked at dinner and again to the guests and members of the Auxiliary at a public meeting later, while medical society members held their meeting.

The speaker in both cases was Dr. Walter S. Judd, Fellow of The Mayo Clinic at Rochester and medical missionary in China.

Excerpts from letters on the Crookston meeting, April 25:

"I wish you could have been here to see the enthusiastic reception given Dr. Judd both at our banquet and at the public meeting. I certainly can see where a man of his caliber would be invaluable in representing the medical profession to the public. He certainly did last night.

"We had a hundred at the banquet, with prominent laymen, clergy, dentists and druggists as guests.

"At the public meeting we must have had about 600."

C. L. Oppegaard, *Secretary,*
Crookston.

"The meeting here Monday night was a huge success. We had men in, who have not shown up for years. Several indicated they would pay their dues and get into the game. Have not had the exact count but the attendance was very large and the spirit good."

W. L. Burnap, *Councilor, District No. 8,*
Fergus Falls.

Advice to Editors

From the "Be On Your Guard" column of the N. E. A. Service Letter, issued by the National Editorial Association to its members:

"Dr. E. W. Lyon, 522 East Genesee Avenue, Saginaw, Michigan: This party submits copy for display advertisements of mail order cure for pyorrhea and asks billing monthly. Investigation indicates that this 'dentist pyorrhea specialist' is a Mr. Quail, a dental mechanic, who has simply adopted the name, 'Dr. Lyon.' Credit rating very poor. Refusal of advertising advised."

Lou Benshoof, editor of the *Detroit Lakes Record* and chairman of the Medical Contact Committee of the Minnesota Editoral Association, applied to the Minnesota State Medical Association office for information on "Dr. Lyon" in the first instance. The state office turned the matter over to the Saint Paul District Dental Society for investigation and forwarded the information to Mr. Benshoof with the above result. Friendly contact with the Editorial Association operates to help in the work of cleaning up and censoring the patent medicine quack advertising printed in country newspapers.

Note also, this one from the same letter:

"S M S Laboratories, Inc.—A fraud order was issued December 7, 1933, against the S M S Herb-Nu Health Institute, S M S Herb-Nu Remedies, Mother Helen, Mother Helen's S M S Remedies, Mother Helen's Herb-Nu Remedies' Company."

Minnesota State Board of Medical Examiners

Check Artist Posing as a Physician Sentenced to Ten Years

State of Minnesota vs. Robert G. Reinardy, alias "Dr." R. G. Brian

Robert G. Reinardy, twenty-six years of age, 1290 Grand Avenue, Saint Paul, was sentenced on April 27, 1934, by the Honorable James C. Michael, Judge of the District Court, to a term of not to exceed ten years at the St. Cloud Reformatory, following a plea of guilty entered by Reinardy to a charge of forgery in the second degree.

For the past six months Reinardy has been posing in Saint Paul as a physician under the name of Dr. R. G. Brian. Using the name of Dr. Brian he cashed a check for $9.00 at the Hillcrest Grocery at 140 W. Summit Avenue, Saint Paul, Minn. When the check came back from the bank marked "no account" the proprietress of the grocery store telephoned the State Board of Medical Examiners for the address of Dr. Brian. There being no Dr. Brian registered under the Basic Science Law, an investigation was immediately made in coöperation with the Saint Paul Police Department which resulted in Reinardy's arrest on April 16 on a charge of forgery. Following his arrest a medicine kit containing various medicines and narcotics was found in Reinardy's home. Shortly after his arrest Reinardy signed a confession admitting that he had cashed several checks and that he had been posing for several months as a physician. He has examined patients and furnished them with medicine, but denied that he ever made a charge for his services. Reinardy's favorite story was that he was a graduate of the Medical School of the Northwestern University; that he had been practicing medicine for nine years. He also stated that he took patients to the Miller Hospital in Saint Paul and St. Mary's Hospital in Minneapolis. This statement on Reinardy's part is absolutely false. Reinardy has never had any medical education whatsoever and at no time has he ever been connected with the Miller Hospital nor St. Mary's Hospital.

Following an investigation by the Probation Officer Reinardy's sentence was stayed and he was placed on probation for three years. He is to report regularly to Mr. Doyle, the Probation Officer, and is to make full restitution for the checks which he cashed. According to the records of the Police Department, these checks approximate $465.00.

The State Board of Medical Examiners wishes to express its appreciation of the coöperation shown by Mr. Thomas E. Dahill, Chief of the Saint Paul Police Department; Detective Lieutenant Frank J. Mondike, in charge of the check department, and his assistant, Detective George I. Hein.

Two Minnesota Physicians Lose Licenses to Practice Medicine

The Minnesota State Board of Medical Examiners at its meeting on May 8, 1934, revoked the license to practice medicine of Dr. Arthur W. Eckstein, who formerly practiced at Mankato, Minnesota. Dr. Eckstein's license was revoked following his conviction on March 31, 1934, of the crime of abortion. Dr. Eckstein is serving two years at hard labor in the State Prison at Stillwater.

At the same meeting the Board revoked the license of Dr. Milton G. Brown, who for the past year has maintained an office at Dakota, Winona County, Minnesota. Dr. Brown's license was revoked because of his habitual indulgence in the use of morphine. Dr. Brown had been before the Board on two previous occasions for the same offense.

In connection with these cases the Board wishes to state that, while it has no desire to be either arbitrary or vindictive, the laws of this State prohibit performing a criminal abortion and the Medical Act expressly provides that the performing of such an abortion by a physician and the use of narcotics by a physician are grounds for revocation of the license to practice medicine. It is the duty of the Board to protect, first of all, the welfare of the public, and the Board intends to fulfill that duty.

Spring Valley Woman Pleads Guilty to Violating Basic Science Law

State of Minnesota vs. Elizabeth Schulz

Elizabeth Schulz, forty-two years of age, entered a plea of guilty on May 9, 1934, before the Honorable Norman E. Peterson, Judge of the District Court at Albert Lea, to an information charging her with practicing healing without a Basic Science Certificate.

Mrs. Schulz, a farm woman living near Spring Valley, Minnesota, was arrested on January 11, 1934, following the death of nine year old Russell Prinsen, who had been under the care of Mrs. Schulz for about six weeks prior to his death. Russell had been ill for sometime with diabetes and had been under the care of physicians at Cresco, Iowa. In November, 1933, Russell was placed under the care of Mrs. Schulz and was given a so-called mineral food. This mineral food was analyzed at the University of Minnesota, and was found to be composed chiefly of sugar of milk. On January 8, when it appeared that Russell was becoming worse, Mrs. Schulz drove over to Austin, where she obtained a prescription from a physician for twenty units of insulin. She gave Russell two administrations of insulin, the first one of five units and the second one of four units. Russell died on January 10, 1934.

After hearing the facts, Judge Peterson sentenced Mrs. Schulz to a term of three months in the Fillmore County jail, which sentence was suspended and the defendant placed upon probation. Judge Peterson ordered Mrs. Schulz to report to him on June 4, 1934, at Preston. A similar charge against Mrs. Schulz was continued until that date. Before sentence was imposed, Senator Henry A. Larson of Preston, who represented Mrs. Schulz, presented to the Court a petition signed by about 1,800 persons, some "demanding" that Mrs. Schulz be permitted to practice, others testifying to the good work and good reputation of the defendant. Judge Peterson disposed of these petitions by remarking that a great many people signed petitions without knowing the facts; that it would be very easy to get people to sign a petition asking that he (Judge Peterson) be hanged.

Judge Peterson commented on the fact that the defendant had refrained from practicing since the time of her arrest in January. He advised Mrs. Schulz that the Basic Science Law was passed for a wholesome purpose; that sick people were very frequently taken advantage of by quacks; that she was not registered under the Basic Science Law and therefore had no

right to practice; that irrespective of the petitions in her behalf she could not be permitted to practice unless she had the necessary qualifications. Mrs. Schulz claims to have attended a school teaching some sort of suggestive therapeutics at Nevada, Missouri, in the summer of 1933; she stated that she attended that school for a period of four weeks; that the tuition fee was $50.00, and that she received two or three diplomas. Outside of a short period of training as a student nurse twenty years ago, Mrs. Schulz has no medical education whatsoever.

Court Orders Hearing on Dissolution of the Northwest Hair Clinic, Incorporated

Following an investigation made by the Minnesota State Board of Medical Examiners into the incorporation of The Northwest Hair Clinic located at 109 South Ninth Street, Minneapolis, Minnesota, a petition for a voluntary dissolution of the corporation was filed by the stockholders in the District Court at Minneapolis on May 4, 1934. On May 7, 1934, the Honorable Arthur W. Selover, Judge of the District Court, signed an order setting June 4, 1934, as the date for the hearing of the petition to dissolve the corporation.

The Northwest Hair Clinic was incorporated originally as the Maison Bernard Cie, Incorporated, on September 16, 1932. The original incorporators were Bernard P. Sholton, Alyce Wendt and L. K. Schroeder. In July 1933, the name of the corporation was changed to The Northwest Hair Clinic Incorporated. The corporation among other things was organized to own and operate "beauty shops and *hair and skin clinics*."

This corporation was advertising a gland extract treatment for the growing of hair. They also advertised that the work was done under "strict medical supervision."

The corporate practice of medicine is not permitted in the State of Minnesota; neither are lay people permitted to practice medicine through the medium of employing a licensed physician. Dr. C. W. Wall, who holds a license to practice medicine in Minnesota, and who was a substantial stockholder in this corporation, was the medical director and conducted the actual business for the corporation.

CONTAMINATION OF FRUITS AND VEGETABLES WITH TOXIC INSECTICIDE SPRAY MATERIAL

The Committee on Foods reports that distributors of fruits and vegetables that may bear toxic spray material are obligated to remove such poisonous contaminations before they enter commerce for retailing to the public, or to warn food manufacturers of the possible presence of the spray residue. Food manufacturers using fruits and vegetables should take proper precautions either to assure the absence of toxic spray contaminations or their removal before the products are prepared or packed for consumption. Distributors of fresh fruits and vegetables and manufacturers of foods containing these products bear a serious responsibility to the public that their products as presented for consumption are entirely wholesome; carelessness or disregard of this public health responsibility is criminal. (Jour. A. M. A., October 21, 1933, p. 1316.)

OBITUARY

Dr. Earle R. Hare
1872-1934

Dr. Earle R. Hare, well known surgeon of Minneapolis, died at his home at the age of sixty-one, Monday, April 8, 1934, after a prolonged illness.

Born May 26, 1872, at Summerfield, Ohio, Dr. Hare took his bachelor's degree at Iowa Wesleyan College, Mount Pleasant, Iowa, and received his M.D. at the University of Minnesota in 1900.

Following his graduation Dr. Hare began practice in Minneapolis and taught anatomy for ten years in the Medical School at the University of Minnesota, after which he was on the surgical faculty of the school for seven years.

Dr. Hare had the distinction of having passed the State Board examination with the highest rank of any licentiate prior to 1900.

One of the organizers and charter members of the board of directors of the Exchange State Bank of Minneapolis and for years a member of the board of directors of the Marquette National Bank, Dr. Hare was also a director of the Marquette Securities Company which later became the Bank Shares Corporation.

Dr. Hare enjoyed a wide acquaintance in professional circles. He was an able speaker, versed in parliamentary procedure and for a period was active in the Minnesota State Medical Association, having served as treasurer for a number of years. He was a member of the Hennepin County Medical Society, the Minnesota State Medical Association and the American Medical Association.

Dr. Andrew J. Ames
1866-1934

Dr. Andrew J. Ames, sixty-eight years old, who had served several years on the examining board of veterans bureau No. 68 at Fort Snelling, died April 12, 1934, in Fargo, N. D., where he had been transferred the previous month by the veterans' administration. Dr. Ames suffered a stroke on April 1 that resulted in his death.

Born at Hutchinson, Minn., Dr. Ames came to Minneapolis as a boy and attended school there. He later was graduated from the University of Illinois medical college. After his graduation, Dr. Ames practiced medicine in Minneapolis until 1902. Then he served in Wheaton, Minn., for three years and in Forbes, N. D., for seventeen years.

In 1921 he was appointed to the examining board at veterans bureau No. 68, Fort Snelling. He also served three and one-half years at a Fargo hospital and three years in Chicago. A member of the Minneapolis consistory, Scottish Rite, Dr. Ames also belonged to Zuhrah temple of the Shrine. He was a member of the Elks Club, the Minneapolis Automobile Club and the Minneapolis Gun Club. In 1925 Dr. Ames was married to Sarah Appleton, who survives, in addition to a sister, Mrs. Florence Walker of Denver.

Dr. Harry Aldes
1884-1934

Dr. Harry Aldes died March 21, 1934, at the age of fifty-one years. Acute cholecystitis, complicated with acute pancreatitis and hepatitis, was the cause of death, terminating an illness of two weeks.

Dr. Aldes was born in Austria, coming to America during his boyhood. His early education was received in Saint Paul and his pre-medical training at the University of Minnesota. He graduated from the Univer-

sity of Illinois in 1911, having worked his way through college. His internship was taken at Bethesda Hospital, and he practiced in Saint Paul from 1912 until the time of his death. He was a member of the staff of Bethesda Hospital throughout his medical career, and manifested unswerving loyalty to the institution and his associates. He was a member of the Ramsey County Medical Society, the Minnesota State and American Medical Associations; a member of the out-patient staff of Ancker Hospital, as well as the medical staff of the Jewish Home for the Aged. He was a charter member of the Phi Delta Epsilon medical fraternity. He was an active member of the Osman Shrine Patrol, the Saint Paul Masonic Blue Lodge and the Order of B'nai Brith.

Dr. Aldes is survived by his wife, Mrs. Tillie Aldes, a son, Berthold, a daughter, Donna, and by his mother, three sisters and a brother. Funeral services were held March 22, 1934, with burial in the Sons of Abraham cemetery.

To the many friends who mourn his passing, the qualities which Dr. Aldes manifested particularly were good fellowship, unfailing loyalty to his associates, and a devotion to his family which has made his going most painful to his dear ones. An enthusiastic fisherman, with an inexhaustible fund of stories and a real sense of humor, he was especially liked by his male friends. His untimely death has created a real sense of loss to those whom he has left behind.

Dr. Lucius F. Foote

1852-1934

Dr. L. F. Foote, for twenty years a practicing physician in Minneapolis, died April 4, 1934, at the Hillcrest Hospital, at the age of eighty-one.

Dr. Foote was born at Janesville, Wisconsin, the son of Rev. Hiram Foote, a pioneer Congregational minister. He attended Carroll College and received his M.D. degree at Northwestern Medical College.

Dr. Foote was a prominent Mason and a member of the organized profession. He is survived by his widow and a sister, Miss Katherine Foote, Rockford, Illinois.

Dr. Carl Haas

1874-1934

Dr. Carl A. Haas, Saint Paul, died on January 22, 1934, at the age of sixty, following an illness of six months.

Born at New Ulm, Dr. Haas was a graduate of the University of Minnesota Medical School and began practice in Saint Paul, where he had been actively engaged in practice until about four years ago.

Dr. Haas is survived by his widow, Mrs. Gertrude Haas, two daughters and a son.

Dr. Otto Johnson

1875-1934

Dr. Otto F. Johnson, Saint Paul, died on January 8, 1934, at his home, 706 East Jessamine Street, following a long illness.

Graduated from Hamline University Medical School in 1901, Dr. Johnson practiced in Winthrop, Minnesota, for sixteen years. He was coroner of Sibley County for three terms and served for many years as chairman of the school board at Winthrop. He retired from practice in Saint Paul in 1919.

OF GENERAL INTEREST

Dr. Robert G. Hankerson, formerly of Elysian, Minnesota, has moved to Minnesota Lake, Minnesota, where he has established a practice.

Dr. Philip F. Donohue of Saint Paul announces the removal of his offices to 423 Lowry Medical Arts Building, Saint Paul, where he will continue his practice limited to urology.

Doctors Eugene S. Strout, John S. Macnie, W. E. Patterson and J. A. Watson moved their offices and that of the Eye, Ear, Nose and Throat Clinic from 74 South Eleventh Street to 1750 Medical Arts Building, Minneapolis, in May.

The Charles Lyman Greene Prize in Physiology, a cash prize of one hundred dollars offered yearly since 1929 by the Minnesota Society of Internal Medicine to an undergraduate in the University of Minnesota Medical School, has this year been awarded to Carroll J. Bellis.

The Minnesota Medical Alumni will hold their dinner meeting on the occasion of the American Medical Association meeting in Cleveland, in the Directoire room of the Carter Hotel, Cleveland, Wednesday, June 13, 1934. Dr. J. A. Myers will act as chairman of the Alumni meeting.

BULLETIN OF THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER

A wide interest in the subject of cancer and its prevention has been manifest throughout the state. One way in which to keep in touch with what is being done in the nation-wide fight against the necessary incidence of cancer is to subscribe to the *Bulletin of the American Society for the Control of Cancer.*

The Bulletin contains numerous short articles of practical value written by distinguished authorities on the subject. The subscription price is only $1.00 a year. A complimentary copy will be sent to any physician who sends such a request to the Society headquarters, 1250 Sixth Avenue, New York City.

EXTENSION COURSES

The attention of medical men throughout Minnesota is called to the fact that the State Medical Association Committee on Education and Hospitals, in coöperation with the General Extension Division of the University of Minnesota, and a faculty committee from the Medical School, has just issued a new bulletin announcing post-graduate lectures and clinics now available for county medical societies and similar organizations of physicians. The list has been thoroughly reorganized and revised, and the topics include a very wide field of study and discussion. The plan is to send out specialists in the different fields for series of from four to eight or ten lectures, coming once a week or twice a month during the season. Different men will come for each meeting and thus an interesting range of subjects will be included. Interested physicians are invited to write to the General Extension Division, University of Minnesota, for a copy of this new bulletin.

MEDICAL STUDY TRIP TO HUNGARY

At the invitation of the Hungarian Medical Postgraduate Committee of Budapest, Professor Emil de Grosz, President, and of the Association "Budapest Town of Medicinal Springs," Archduke Dr. Joseph

Francis, President, a medical study trip to Hungary is being organized. The plans provide for a fortnight visit to Hungary during which there will be post-graduate lectures and demonstrations in English at the principal University clinics and at the municipal thermal baths and springs. Reduced railroad fares and hotel rates are granted by the Hungarian Government. The party will sail from New York on August 18, 1934, visiting Munich and Oberammergau en route. The return trip may be made, optionally, via Berlin, Paris, or Italy, arriving back in New York on September 30.

American physicians of good standing are invited to join. The American Committee of the study trip consists of Harlow Brooks, M.D., Chairman, Charles G. Kerley, M.D., Jerome M. Lynch, M.D., Wendell C. Phillips, M.D., and Erwin Torok, M.D. Richard Kovacs, M.D., 1100 Park Ave., New York, is Secretary.

Heart Committee

Minnesota State Medical Association

THE INCREASING INCIDENCE OF CORONARY THROMBOSIS*

FREDRICK A. WILLIUS, M.D.

Rochester, Minnesota

Vital statistics and data from other sources call attention to the alarming increase in heart disease. Figures of the United States Census Bureau, for example, gave the death rate from heart disease as 132 per 100,000 population in 1900, whereas deaths from heart disease attained the startling rate of 186 per 100,000 population in 1925. Thus, the march of time witnesses the increasing slaughter of America's millions by heart disease, and in the vanguard of this malicious host is coronary disease which no longer respects certain age groups and is progressively depleting the ranks of younger persons.

Only twenty-two years have elapsed since Herrick made his now famous diagnosis of coronary thrombosis, the first recorded in the United States. Several years went by before the earnest students of medicine became cognizant of the condition, and the majority of members of the medical profession were not aware of the disease until many years later. Even today, in spite of the deluge of articles and monographs which has flooded medical literature, the disease still goes unrecognized.

It seems fitting again to call the attention of members of the medical profession to the alarming increase in coronary thrombosis and to the necessity for its prompt recognition. I can cite only the results of an analysis of available material, and I have chosen those cases occurring at The Mayo Clinic from 1922 to 1933, inclusive. Only occasional instances of coronary thrombosis were recorded prior to 1922, although the first clinical diagnosis of the disease at the clinic occurred in 1915.

I am aware of the fact that statistical studies dealing with the incidence of disease are not without errors, but I have attempted to minimize them in this study by comparing the actual number of cases of coronary thrombosis each year with the total registration of new patients.

Figure 1 vividly portrays the increase in the disease from an incidence of only 0.006 per cent in 1922 to an incidence of 0.300 per cent in 1933. The years of business adversity must be considered in this analysis as the drop in 1923 and the rather fixed incidence in 1930, 1931, and 1932 may have been influenced by the drop in registration. However, the incidence in the three years last mentioned probably reflects a greater absolute increase in the disease than is indicated in this figure. The enormous increase during 1933 is most significant and may represent the true beginning of an alarming situation which may be the result of influences from the preceding years of adversity.

White, in commenting on the increasing incidence of coronary disease, made the following statement: "My

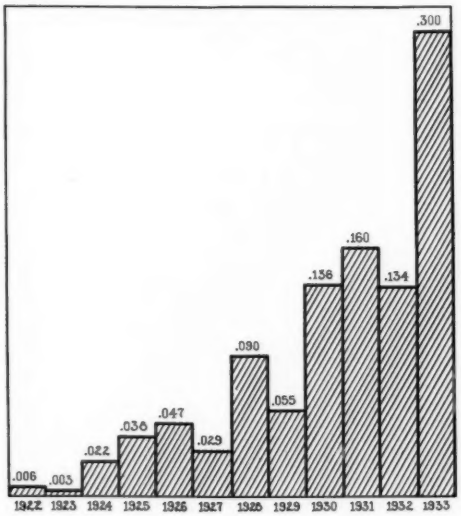

Fig. 1. Increase in incidence of coronary thrombosis at The Mayo Clinic for twelve years, per cent of first admissions.

own recent experience . . . has made me believe that the situation is appalling and demands some action on our part. Almost certainly the most effective move that we can make is to call a halt on the world's mad rush of today."

One of the disconcerting facts regarding the present situation is the increasing incidence of the disease among younger persons. It is now extremely common among persons in the fifth decade of life, it is appearing with alarming frequency among those in the fourth decade, and it occasionally is observed among those in the third.

When the incidence of any disease is on the upturn, its manifestations may be expected to become increasingly atypical. This condition exists today, and cases of coronary thrombosis are constantly being observed that in most respects depart widely from the classic description of the disease. Members of the medical profession must acquaint themselves with these facts in order to permit early recognition and to be in the position to give proper advice to the patient. Only too often the patient is said to have "acute indigestion," and his physician permits him to return to his work after the pain of the attack has subsided. If treatment has any value whatsoever in this disease, absolute rest during the first five or six weeks largely determines the patient's chances for survival.

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2. White, P. D.: Heart disease. New York, The Macmillan Co., 1931, p. 609.

*From the Section on Cardiology, The Mayo Clinic, Rochester, Minnesota.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MEDICAL BROADCAST FOR THE MONTH

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 10:30 o'clock every Wednesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of June will be as follows:

June 6—Some Herat Disease Problems.

June 13—Care of Crippled Children.

June 20—Conjunctivitis.

June 27—Cancer of Stomach.

THE STATE ASSOCIATION MEETING

Members of the Minnesota State Medical Association will have the opportunity of hearing the following out-of-state visitors at the annual meeting to be held in Duluth July 16, 17 and 18, 1934: Dr. Walter Bierring, Des Moines, Iowa, president of the American Medical Association; Dr. A. B. Moore, Professor of Roentgenology at Georgetown University, Washington, D. C., and first lecturer for the Russell D. Carman Lectureship newly established by the Minnesota Radiological Society; Dr. C. C. Little, New York City, executive secretary of the American Society for the Control of Cancer.

The Scientific Demonstration and Exhibit section of the state meeting is to be the most extensive ever attempted at our meetings. It covers a variety of subjects of immediate, practical interest to the profession and falls in with the newer trend in medical meetings, which everywhere is toward the small group units. In order to give members some idea of the exhibits to be presented, the following partial list is appended:

Carbon Monoxide Poisoning—F. J. Elias, Duluth
Cosmetics Having a Health Hazard—A. J. Cramp, Chicago
Emergency Treatment of Fractures of the Femur—Clarence Jacobson, Chisholm
Treatment of Fractures—Orthopedic Club, Duluth
Ambulant Treatment of Hernia—A. F. Bratrud, Minneapolis
Autobiography of Mandible—A. H. Fee, Duluth
Pathology of Amebiasis—T. B. Magath, Rochester
Arteriography—E. V. Allen and J. D. Camp, Rochester
Blood Dyscrasias—F. J. Heck, Rochester
Types of Diffuse Arterial Disease with Hypertension—N. M. Keith, H. P. Wagener and N. W. Baker, Rochester.
Neurologic Diagnosis and Surgery—A. W. Adson et al, Rochester
Physical Therapy—M. E. Knapp, Minneapolis
Pneumonitis Produced by Fungus Spores—J. W. Towey, Powers, Mich.
Pulmonary Carcinoma—F. F. Callahan, Pokegama
Occupational Dermatoses—Louis Schwartz, New York
Epidemic Encephalitis—U. S. P. H. S.
Lead Poisoning and Silicosis—R. R. Sayers, Washington, D. C.
Trichinosis—W. A. Riley, Minneapolis
Tularemia—R. G. Green, Minneapolis
Experimental Study of Visceral Pain—E. A. Boyden and L. G. Rigler, Minneapolis
Contagious Diseases—E. S. Platou, Minneapolis
Artificial Respiration—J. S. Lundy, Rochester
Injection of Varicose Veins—M. G. Gillespie, Duluth

In addition, numerous committees of the State Medical Association will present exhibits.

Members are urged to make hotel reservations for the Duluth meeting in advance. These may be made direct, or through Dr. A. O. Swenson, 1510 Grand Avenue, Duluth, chairman of the local Committee on Hotel Reservations.

A record attendance at the Duluth meeting is expected.

AMERICAN MEDICAL ASSOCIATION MEETING

The eighty-fifth annual session of the American Medical Association will be held in Cleveland, June 11-15, 1934.

The House of Delegates will convene at 10 A. M. Monday, June 11, in the Ball Room of the Hotel Statler. Minnesota will be represented by Drs. H. M. Johnson, W. F. Braasch and J. T. Christison. Delegates from the scientific sections include Dr. N. M. Keith, Pharmacology and Therapeutics, and Dr. Henry W. Meyerding, Orthopedic Surgery.

Headquarters will be at the Cleveland Auditorium and the scientific sections will meet in the various halls of the auditorium. The scientific exhibit will be displayed on the Arena Floor of the same magnificent building.

Of interest to many members will be the annual golf tournament of the American Medical Golfing Association set for Monday, June 11, at the Mayfield Country Club. The Will Walter trophy will be awarded for the low gross thirty-six holes. Some fifty prizes will be awarded in all. All Fellows are eligible and those interested should communicate with Bill Burns, 4421 Woodward Avenue, Detroit, Michigan.

AMERICAN PROCTOLOGIC SOCIETY

The thirty-fifth annual meeting of the American Proctologic Society will be held in Cleveland, Monday and Tuesday, June 11 and 12, 1934, in connection with the meeting of the American Medical Association. Scientific sessions will occupy the two days with the annual dinner Tuesday evening. Headquarters will be at the Hotel Cleveland. Dr. Frank G. Runeyon, 1361 Perkiomen Avenue, Reading, Pa., is secretary of the organization.

NEW YORK ACADEMY OF MEDICINE

1934 Graduate Fortnight

The Seventh Annual Graduate Fortnight of The New York Academy of Medicine will be devoted to a consideration of Gastrointestinal Diseases. The Fortnight will be held October 22 to November 2, 1934.

Sixteen important hospitals of the city will present coördinated afternoon clinics and clinical demonstrations. At the evening meetings prominent clinicians from various parts of the country who are recognized authorities in their special lines of work will discuss the various aspects of the general subject.

A comprehensive exhibit of anatomical, bacteriological and pathological specimens and research material will be shown. Many of the exhibits will be demonstrated.

The profession generally is invited to attend.

A complete program and registration blank may be secured by addressing Dr. Frederick P. Reynolds, The New York Academy of Medicine, 2 East 103d Street, New York City.

May 10, 1934.

HENNEPIN COUNTY SOCIETY

At the regular meeting of the Hennepin County Medical Society on Monday evening, May 7, 1934, the results of the election were announced as follows: President, Dr. J. M. Hayes; first vice president, Dr. W. H. Aurand; second vice president, Dr. J. H. Simons.

Dr. Moses Barron and Dr. Gilbert Cottam were elected to serve on the Executive Committee, Dr. W. E. Camp and Dr. C. R. Drake, Board of Censors; Dr A. S. Hamilton and Dr. E. W. Hansen, Board of Trustees; Dr. Oscar Owre and Dr. C. A. Stewart, Ethics Committee.

Delegates to the State Convention are: Drs. C. A. Stewart, D. P. Head, E. K. Green and E. S. Platou; alternates, Drs. F. G. Benn, R. F. McGandy, G. T. Nordin and F. A. Olson.

NORTHERN MINNESOTA MEDICAL ASSOCIATION

The Northern Minnesota Medical Association will hold its annual meeting September 10 and 11, 1934, at Brainerd. Dr. F. J. Hirschboeck is chairman of the Program Committee.

SOUTHERN MINNESOTA MEDICAL ASSOCIATION

The annual meeting of the Southern Minnesota Medical Association will be held in Mankato, Minnesota, Monday, August 13, 1934, in an all-day session.

The first hour of the day from 8 to 9 A. M. will be devoted to demonstrations by local physicians and the remainder of the morning to a discussion of symptoms with addresses and pre-arranged discussions.

The business meeting will be held in connection with luncheon and the afternoon session will consist of scientific papers. Special stress will be laid on the presentation of case reports and a medal will be presented by the committee on case reports for the best presentation.

The annual banquet will be held at 6 P. M., to be followed by addresses.

Dr. Porter P. Vinson is chairman of the Program Committee and communications regarding the program may be addressed to him in care of The Mayo Clinic, Rochester, Minnesota.

SOUTHWESTERN MINNESOTA SOCIETY

The Southwestern Minnesota Medical Society held two medical meetings at Fulda.

On April 30, 1934, a short business meeting was held. Dr. L. M. Randall, Rochester, lectured on "Endocrinology as It Applies to the Gynecological Patient." Dr. E. H. Rynearson, Rochester, lectured on "Diabetes."

On May 7, 1934, Dr. Philip S. Hench, Rochester, lectured on "Arthritis." Dr. L. E. Prickman, Rochester, lectured on "Hay Fever—Treatment and Results of Extra-mural Treatment, or Pollen Fever and Vasomotor Rhinitis."

WASHINGTON COUNTY SOCIETY

Frank Savage, M.D., president of the Minnesota State Medical Association, in his presidential letter which appeared in the March number of MINNESOTA MEDICINE, deplored the fact that the death rate from tuberculosis in girls between the ages of sixteen and twenty-two has not been lowered. Dr. Savage's letter is very timely and pertinent. It is to be hoped that all county societies will take this matter up and do all they can to fight this dreadful disease by educating these young people not only in the state of Minnesota but all over the United States.

Acting on this, the Washington County Medical Society started an educational campaign sponsored by the Minnesota State Public Health Association to engage the coöperation of these girls in an effort to reduce the incidence of this disease in this age group.

William O'Brien, M.D., associate professor of pathology at the University of Minnesota, started this campaign by lecturing to the Stillwater high school girls recently. The doctor emphasized several points. As there is no place like home, love for home should be cultivated, as these girls some time or another will be the principal members of homes of their own. The home should not be regarded as a place to go when no other place is available. In advocating no freak diets he urged his hearers to keep up their weight and have well balanced and nutritious meals. He further advised healthful out-of-doors exercise, plenty of rest and sleep, and absolutely no alcohol in any form. Young people do not need alcohol and many irreparable disasters have occurred from its use by the young.

E. SYDNEY BOLEYN, M.D., *Secretary.*

WOMAN'S AUXILIARY

President—MRS. A. A. PASSER, Olivia
Chairman Press and Publicity—MRS. GLEN R. MATCHAN, Minneapolis
Editor—MRS. S. H. BAXTER, Minneapolis

Dr. W. C. Bierring, Des Moines, president of the American Medical Association, will head the list of speakers for the twelfth annual convention of the Woman's Auxiliary to the Minnesota State Medical Association which will be held in Duluth July 16, 17 and 18. Other speakers on the program include Mrs. James Blake, past president of the National Auxiliary, and Dr. A. J. Cramp of Chicago, director of the Bureau of Investigation, American Medical Association, who will speak on "Mrs. Gullible's Travels in Cosmetic Land." The members of the Advisory Council, Dr. E. A. Meyerding and Dr. L. R. Critchfield of Saint Paul and Dr. C. B. Wright of Minneapolis, will be heard at the luncheon meeting Tuesday, July 17.

For entertainment of the visiting women there will be a boat ride on the steamer Montauk on Monday afternoon up the St. Louis River to be followed by a joint meeting with the Medical Association that evening. On Tuesday afternoon, July 17, following the luncheon an automobile ride and a garden tea party are planned to be followed by a joint banquet with the Minnesota State Medical Association at the Hotel Duluth.

The annual meeting and luncheon will take place on Wednesday, July 18, at the Kitchi Gammi Club with Dr. A. J. Cramp as speaker.

All doctors' wives and families are cordially invited to all sessions, both business and social. Registration will be at the Hotel Duluth, with Mrs. B. F. Davis of Duluth in charge. The St. Louis County Auxiliary, headed by the president, Mrs. Anthony J. Bianco, has planned to make our three-day meeting in Duluth a memorable occasion.

CAMP RELEASE AUXILIARY

A meeting was held at the Masonic Hall, at Dawson, April 26, 1934, with the president, Mrs. J. J. Dordal, in the chair. Officers elected for the ensuing year are as follows: President, Mrs. Herman Johnson, Dawson; vice president, Mrs. Sanderson, Granite Falls; secretary and treasurer, Mrs. H. T. Sherman, Bellingham.

HENNEPIN COUNTY AUXILIARY

At the annual meeting of the Hennepin County Auxiliary the following officers were elected for the ensuing year: President, Mrs. Gustaf T. Nordin;

president-elect, Mrs. Glenn Matchan; first vice president, Mrs. W. W. Moir; recording secretary, Mrs. H. W. Quist; corresponding secretary, Mrs. C. A. McKinlay; treasurer, Mrs. F. S. McKinney; auditor, Mrs. J. M. Hall; custodian, Mrs. C. A. Boreen.

KANDIYOHI-SWIFT-MEEKER AUXILIARY

A meeting was held at the Lakeland Hotel, in Willmar, April 19, 1934. Meeker County Auxiliary joined the Kandiyohi-Swift group at this time to conform to the recent change in the Medical Society. The following officers were elected: President, Mrs. C. L. Scofield, Benson; vice president, Mrs. H. E. Wilmot, Litchfield; secretary, Mrs. B. F. Smith, Willmar; treasurer, Mrs. W. J. Doswell, Kerkhoven.

Mrs. Scofield presided at the business session following the dinner and Mrs. A. A. Passer was guest speaker.

MOWER COUNTY AUXILIARY

Members of the Mower County Auxiliary held their annual meeting, March 26, 1934, at the Y.W.C.A. in Austin. Officers for the ensuing year were elected as follows: President, Mrs. G. E. Hertel; vice president, Mrs. L. G. Flanagan; secretary, Mrs. R. S. Hegge; treasurer, Mrs. Paul Leck, all of Austin.

During the year twelve layettes were made and given out and baskets given to needy families.

OLMSTED-HOUSTON-FILLMORE-DODGE COUNTIES AUXILIARY

Future plans for meetings of the Woman's Auxiliary to Olmsted-Houston-Fillmore-Dodge County Medical Society will be made by a committee consisting of Mrs. L. M. Randall, Rochester, chairman; Mrs. J. A. Mallerich, Caledonia; Mrs. C. E. Bigelow, Dodge Center; Mrs. C. B. McKaig, Pine Island; Mrs. George Edwards, Canton; Mrs. Oscar C. Heyerdale, Rochester.

Appointment of the committee was announced at a meeting held in conjunction with the Medical Society April 25, 1934.

The Auxiliary reëlected the officers just completing the year: President, Mrs. Fred P. Moersch, Rochester; vice president, Mrs. George Eusterman, Rochester; secretary, Mrs. F. C. Dolder, Eyota.

RENVILLE COUNTY AUXILIARY

Renville County Auxiliary was organized at a meeting held at the home of Mrs. A. A. Passer of Olivia, on Tuesday, May 1, 1934, as an auxiliary to the newly formed Renville County Medical Society. The members were former members of Camp Release Auxiliary. Officers elected are as follows: President, Mrs. J. J. Dordal, Sacred Heart; vice president, Mrs. R. S. Madland, Fairfax; secretary and treasurer, Mrs. G. H. Mesker, Olivia.

TRANSACTIONS *of the* MINNEAPOLIS SURGICAL SOCIETY

STATED MEETING HELD MARCH 1, 1934

The President, Dr. Kenneth Bulkley, in the Chair

WHO ARE THE PEOPLE IN THE BREADLINE?

C. M. Roan, M.D.*

Coming directly from the dinner meeting of the Athletic Club where we were told by Professor Thomas how to prepare a manuscript and how to appear before an audience, I hesitate to speak and that for obvious reasons. This is not a paper, it is only an impromptu presentation.

First, I wish to tell you how I happened to deviate from the straight and narrow path of the practice of medicine. Some of you may have wondered why. I had paid no attention to local government, or government of any kind, until 1925, when, by an accident, as it were, I was thrust into public life. It was a rainy afternoon when a number of cars, including mine, collided on Superior Boulevard. Dr. Hugo Hartig, who rode with me, never knew what struck him, as he died instantly. Mayor Leach asked me to take Dr. Hartig's place on the Board of Public Welfare, which I did. There were no problems then as there are now, but nevertheless I believe I rendered a valuable service.

You may remember how all things were prepared to move the General Hospital to the University Campus. I could not see it that way, and the result was that the General Hospital was not moved. The deal would have cost the city seven million dollars, and, furthermore, it probably would have resulted in the loss of the management of the hospital. Many members of the profession were against me at the time, but I have reason to believe now that they have changed their opinion.

In discussing my topic I shall be brief, for I realize there are more interesting matters to come before this meeting. The subject is not entirely foreign to surgery because the present unemployment situation is affecting professional men very seriously. I might say that I would like to see medical men take more interest in civic affairs. The present situation in our city, and in the country at large, calls for men who are willing to go to the front, willing to speak their minds, and willing to stand for a principle. That question, however, is too big for me to discuss now.

Who are the people in the breadline? To begin with, I will tell you of my experience today. Members of the Board of Public Welfare are not supposed to be seen by people who are in need, but I will not criticize them for coming, nor perhaps would you. (May I intermit that all appointive members of the Board serve without pay.) The law requires that those who are in need must make application themselves at the agencies established for this purpose, but it is hard to go alone when the direction is towards the public breadline. With all the energy you may have, your knees would falter also if you were compelled to seek public aid.

As I walked into my office this morning a civil engineer was waiting for me, and if I were to mention his name all of you no doubt would know him—a graduate of our university in the class of 1910. As a professional man he carried on his work successfully in our city for a number of years, whereupon he moved away and was gone long enough to lose his rights as a local citizen. The law requires one year's residence before public aid can be given. This man was in dire need, and he sought my aid after having been turned down by the investigators.

This afternoon a woman came into my office asking me to intercede for her. She is a scrubwoman in one of the downtown buildings, supporting a family of

*Member of the Minneapolis Board of Public Welfare.

seven children. Several of her children are grown-up, three of the boys being able and willing to work but cannot find employment, and here this poor mother, scrubbing floors for only $40.00 a month, is trying to support her large family, which effort of course is utterly impossible on that wage. In normal times such a family would never think of seeking public aid.

A third person also came to see me this afternoon, a widow. I knew her husband when he was considered to be a very wealthy man. I believe, he was worth at least $50,000; all his money I am told was invested in farm mortgages. Today, after his death several years ago, his widow is down and out and must have public aid, as she has not been able to realize on her husband's investments. She wept as she feared the thought of the breadline.

There are three classes of people in the breadline. The first is the chronic class which always will be on public charity. Fortunately, they constitute a very small percentage of those in the line now, perhaps not over 1 per cent.

The second class is constituted of those people for whom things go wrong in the best of times due to illness, bad investments, hard luck of one kind or another, but fortunately in good times their distress is of short duration.

If you have not already seen the breadline in our city, I trust you all will attempt to do so. You will have answered for yourself the question as to who the people are who are getting public relief. You will see your friends, your neighbors, and your patients there. It will do you good to see what is going on in our midst.

One of my doctor friends asked me recently about the substation at Bloomington Avenue and Lake Street, saying: "Doctor, why did the Board of Public Welfare locate a substation out here?" He said he could not sleep the first night after seeing that line. Even though he could not sleep he will benefit from seeing what his fellow citizens are up against.

The third class of people in the breadline consist of our best citizens who by reason of circumstances over which they have had no control have been compelled to seek public aid.

My private waiting room is frequently filled with people I have known for years, all asking me to intercede for them at the City Hall. Sometimes I nearly give up under the strain, for it is distressing to see people one never thought would need public aid, coming to the breadline. When I say we have the best of our people in the breadline in Minneapolis you probably will not believe me. Among others there are efficiency experts, ex-bankers, graduate nurses, physicians, dentists, and attorneys in the line. A week ago the Civil Service Commission conducted an examination for social service investigators in Class B, which can be taken by anyone having a high school education, and, of the 300 persons who took the examination, I am told a large number were attorneys. This situation illustrates present conditions. Class A can only be taken by persons who have completed a course in Sociology at the University. Last week I helped place in the breadline one of our very able dentists. Undoubtedly you would all know him if his name were mentioned.

Let me review briefly what has been done and what constitutes our greatest problem at the present time: Last year the relief budget amounted to approximately $4,000,000. The budget was raised as follows: $2,700,000 by the sale of relief bonds, $1,379,000 provided by the federal government, and about $80,000 from tax levies. This year the estimated budget will run in excess of $4,000,000. We are asking the federal government for a grant of $2,700,000 and the Board of Estimate and Taxation for the sale of $1.500.000 of relief bonds. In addition there are about $60,000 from tax levies that will go into the budget. In 1929 the budget requirements of the relief department amounted only to $172,000. From this you can see for yourself what has happened over a period of five years—all due to unemployment.

Ninety-eight per cent of the men and women in the bread line are willing to work. A few years ago the situation was quite different. The tables have been turned. I recall during the World War we wanted to employ a maid in our home. We tried every possible agency for a white girl, but could not get one, so one Sunday evening I drove to a church for colored people hoping I could find some one there who would be willing to work for good pay, but no. That was the condition some years ago.

When the CWA projects were started in Minneapolis the federal government requested the Board of Public Welfare to place 6,500 family men to work. We had, at the time, about 13,000 family heads on our lists. The other 50 per cent were to be taken from the registered unemployed at the federal agency. There were 40,000 men registered there, so that the 6,500 men taken for the first allotment left many who had expected to be given something to do disappointed and despondent.

Of the many things President Roosevelt has done, the CWA was the first real thing the President did for the average citizen. You possibly cannot understand what it means to be without any earnings, or income, for any length of time. When I was a young practitioner and had taken in only a few dollars during the week, I know how I felt when Saturday night came along. After two or three years have gone by without earning a penny, men who used to provide well for their families, always meeting their obligations, have difficulty under present conditions to maintain their morale, and no one can blame them. Never have I seen such happiness as evidenced by the men over the little money they were able to earn on CWA projects during the last few months. One man came to me saying: "Doctor, look at me and see what I have now. Look at my overcoat, my suit, my shoes, and my hat! I have not had a decent piece of clothing for three years, look at me again.'"

To the more than four thousand homeless, single men in the gateway we cannot say, "Go out and get something to do." This would be absurd because there are no real jobs to be had. I remember well the depression of the nineties. I was a boy, living on a farm which my father owned, and besides, being a Civil War Veteran, he had a small pension, so we suffered nothing. The question is frequently raised now, "Why don't you send these men out and make them go to work as it was done in '94?" If you stop to think what the population of the United States was in '94 and compare it with the population today, you will see that there is a vast difference. Then, there were 70,000,000 people, and today there are 122,000,000. In other words, there are 52,000,000 more than in '94. While it was very difficult to obtain a little employment then, it is wellnigh impossible now. The machine has taken jobs away from our people.

Whatever measure of prosperity will return under the New Deal, there will in my opinion always be a large number of men in our country who will not be able to find employment—probably from four to eight million men, and they will constitute a grave problem.

Today we have as many families in the breadline as we had last fall before the CWA projects were started. Shortly afterwards the number dropped but new families came in—families who had held out until the last moment, using up every possible resource, borrowing on their life insurance, borrowing from friends, and moving together, but who are now compelled to seek public aid. As spring arrives it is hoped conditions will improve.

So far the city's credit has been good. However, if within eighteen months or two years from now conditions have not improved, Minneapolis in my opinion will be unable to maintain her credit and what the situation then will be I hesitate to prophesy.

I trust, men, that you will think rationally about those of our citizens who are compelled to be in the bread-

line, and that you yourself will be thankful for whatever means of livelihood you may possess.

SKIN GRAFT BY SEED IMPLANTATION

H. O. McPheeters, M.D.

I realize full well that it is indeed a presumption on my part to suppose for a moment that I could tell this group anything on the subject of skin grafting. This is such a common operative procedure and apparently one so easily carried out that a discussion of it may seem needless. Yet, we often find that the most simple and useful things are not fully appreciated and that any technic, regardless of how perfect, may be improved upon. As I studied the subject I realized how little I knew about it and I feel a brief review will not hurt us. It is with this thought in mind that I have the temerity to take your time.

There are many different types of grafts and for each there is a definite use and indication. I believe that the best and most simple classification is that of Davis. He divides them into the thin (the true Reverdin, the Ollier-Thiersch and the Seed Implants of Braün); the thick (the small deep graft of Davis, the Wolfe-Krause graft, the Blair full thickness graft); the pedicled flap; and the tube graft. It would be best if all these grafts were spoken of according to the Davis anatomical classification and not by the name of the surgeon having his name attached to it.

The skin consists of three main layers, the epidermis, the dermis or true skin, and the hypodermis or subcutaneous layer. The epidermis has several layers, the chief of which are the stratum corneum or outer layer of cornified epithelium, the stratum germinativum or basal layer of nucleated columnar cells implanted by denticulated edges on the basement membrane of the corium. It is principally from the cells of the germinal layer that the new skin develops. The dermis or true skin is divided into the stratum papillare, containing the papillæ jutting upward into the germinal layer and carrying the terminal buds of nerves and vessels and sebaceous glands, and the stratum reticulare, which carries the main vessels and nerves supplying the skin and the hair follicles with some glands. The hypodermis or subcutaneous layer contains mostly fatty tissue carrying the sweat glands, the blood vessels, nerves and hair roots or papillæ.

The thin grafts are taken down through the germinal layer but should not be deep enough to cause bleeding, rather only a serous oozing, and should contain no fat, while the pedicled flap and tube grafts take all the layers, the fat included.

Wet saline packs are usually kept on for several days. With either the Reverdin or the Thiersch graft much care must be used in changing the dressings to avoid pulling off the recently applied grafts not yet firmly adhered. Neither of these grafts can be used with any degree of success if there be much infection present.

The Thiersch and the Ollier-Thiersch grafts are the ones most commonly used. They are usually 2 to 3 cm. wide and 10 to 12 cm. long. For their use the bed must be carefully prepared, there must be no infection present, the parts must be kept immobilized and the post-operative care is very important in securing a good result. For small areas 4 to 6 inches square they are perhaps the best. The Reverdin graft is a pinch graft made by nipping off small bits of skin 5 to 10 mm. in diameter, with a sharp scissors. They are simply planted about over the granulating area. The part must be immobilized and pressure applied to keep the grafts in close contact with the vascular granulations.

It is particularly the thin graft taken and cut into small bits and implanted after the method of Braün that I will discuss at this time. This graft is really a modification of the thin Reverdin or Thiersch grafts. It was first suggested by Dr. Wilhelm Braün of the Friedrichschain Hospital in Berlin, in 1920. But very little has been written on or about it and the only article of any importance in the American Press was by Dr. O. W. Wangensteen in the publication, *Surgery, Gynecology and Obstetrics*, for March, 1930. The injection of macerated skin with a syringe directly into the granulation tissue as suggested by Mangoldt is similar in theory to the Braün idea, yet not so efficient.

The seed grafts are best taken by picking up the skin on a needle point and then cutting under it with a real sharp scissors or scalpel. Davis emphasized the effect of trauma in cutting the graft as a potent factor in causing its death. In taking his "small deep grafts" he insists on the use of the scalpel and no scissors. I believe that with sharp scissors this danger is of little consequence. The graft removed should be cut into small bits 2 to 4 mm. square or about one-half the size of a grain of wheat. These small bits of skin are then implanted deep into the granulations as shown by the illustration. When thus implanted they are not washed off by the exuding serum or torn off when the dressings are changed. They are continually bathed in the serum and the blood of the living granulation tissue instead of being merely held firmly against it by pressure as with the other grafts. It matters not which side of the graft is up. The grafts should be implanted about 1 to 1.5 cm. apart. The granulation bed does not have to be sterile as with the other grafts. On the contrary, they can be placed in any ulcer bathed in pus. The postoperative care is the same as before the implantation. If the case is bed-ridden, then the best results are obtained by continuing warm saline packs for the first few days, alternating with para-theo-cresol solution as wet packs for forty-eight hours at a time. If the granulations are too exuberant, then apply adhesive strapping firmly over the entire wound for three to four days. If the case is ambulatory apply any ointment dressing to protect the granulations and change as before. The use of the para-theo-cresol ointment under the trade name of Ointment Sulphen "McNeil" is of definite value. This ointment also toughens and thickens the skin after healing.

Just as all the other methods have their shortcomings so do the "seed implants." They should not be used on the exposed parts, as the face, arms, etc., for cosmetic reasons. As the grafts grow they are uneven in height and seem to form islands, and the areas between them retain their redness for a long time. The skin seems to be more tender and it is slower in becoming firm and tough. Naturally, it is more easily lacerated and bruised. On the dependent extremity the grafted area should have support for a long time, as with the Ace bandage, Unnas cast or elastic stocking.

This method not only shortens the healing time of any large ulcer, varicose, traumatic or otherwise, but it rapidly covers over the granulating area and thus prevents extensive scar formation with its resultant contraction and deformities. If, in the individual case, the result is not satisfactory, resection of the healed area can easily be done and a full thickness flap be applied.

In conclusion, I present the Braün method of seed implantation not as the "ideal" but as one which I believe is not used to the fullest extent of its possibilities. I believe it should be used more in the extensive burns and granulating areas seen in industrial surgery and practice. It certainly will shorten the healing time of any wound and thus lessen the pain of repeated dressings. It can be used when other methods cannot. The exact method of implanting the seeds by using the point of the hypodermic needle instead of the head of the skin needle I believe is original and an improvement in the technic as used in the past.

DISCUSSION

Dr. James A. Johnson: In performing skin grafting it is well to keep in mind the general condition of the patient. A few years ago I undertook the skin graft of an extensive burn. Repeatedly the grafts failed to take. I was unable to explain this, but after investigation I found that the general condition of the patient

was very poor, the hemoglobin and red blood count being low. After several transfusions, together with sunlight and consequent improvement in general health, the skin grafts grew without any further difficulty.

Fig. 1 (*upper left*): The dark ring outlines the size of the original varicose ulcer. Five of the six *seed* implants are shown as islands of new skin ten days old.
Fig. 2 (*upper right*). The original implants have now grown to size of quarters. The small areas show thirteen growing implants of the fifteen made. The large islands are here three weeks old. The small islands are ten days old.
Fig. 3 (*below*). Extensive case of skin and fascia destruction following injury. Two hundred and ten *seed* implants were made and 165 took. The implants here were twelve days old.

DR. J. F. CORBETT: I notice that the essayist, in referring to pinch grafts, minimizes the importance of infection. However, infection is an undesirable thing. I yet believe, in order to get a comparatively clean surface, various agencies are tried on a large number of cases at the Rockefeller Institute and they find the best way to get these surfaces reasonably sterile is by the use of soap and water, and that the percentage of "takes" were much better when they did go through this preliminary cleansing than when that was not done.

DR. GEORGE R. DUNN: I would like to ask Dr. McPheeters if he has had any difficulty in the granulations overgrowing the implanted grafts,—the grafts becoming buried in the granulation tissue.

DR. THEODORE SWEETSER: I might make one remark. We had a patient who was injured in an automobile accident in the East. A full thickness graft was put on down there and the patient later returned to Minneapolis. We used this implant graft method on the part that had not healed. I was surprised to see that the general cosmetic result was better where the implant grafts were used than where the full thickness graft was placed.

DR. H. O. MCPHEETERS: In reply to Dr. Corbett's inquiry I will say that the presence of much infection spells failure for the Thiersch, Reverdin and full thickness grafts. It seems to be of little consequence when the seed graft is used. Healthy granulations are needed and one surgeon has suggested that the grafts seem to take better in the presence of infection.

The rapid overgrowth of the granulations is best controlled by adhesive strapping directly over the wound. They should be put on tightly so as to give pressure.

Under the theo-cresol stimulation the low areas between the islands seem to fill out and the skin becomes quite level and smooth.

EXOPHTHALMIC GOITER VERSUS TOXIC ADENOMA

CLINICAL AND PATHOLOGIC DIFFERENTIAL FEATURES

CARL O. RICE, M.D.

A discussion of the differentiation between exophthalmic goiter and toxic adenoma can always be stimulated between students of thyroid problems. It is intended to point out in this paper a few of the differential features which make these closely allied diseases appear to be two distinct clinical and pathologic entities.

In order to understand this problem it is necessary to revert to a review of the study of the normal thyroid gland with its numerous variations in the individual. It has been observed that the thyroid gland develops a definite sequence of histologic changes during its growth in the normal individual, which probably represent its response to physiologic stimuli as it passes through the numerous strains and stresses of life.

At infancy the thyroid gland weighs approximately 1.5 grams. As the child develops, there is a rapid increase in the weight of gland, which reaches its maximum, averaging 30 grams, during early adult life. Following this there is a gradual decrease in the weight of the gland as the individual passes into old age. The normal range of variability may be from 10 to 50 grams.

Associated with this there is a change in the size of the acini from the small, closely packed, colloid-free acini of infancy to the large colloid-filled acini of puberty and early adult life, and again a decrease in their size with the decrease in the weight of the gland and advancing years. The range of normal variability in the size of the acini may be found to extend from 50 to 400 microns in the adult.

The acinar epithelial cells change with the size of the acini. The small acini of infancy are composed of cuboidal cells. As the acini increase in size the epithelial cells become lower. They may even become flat.

Coincident with these histologic changes through the life cycle of the thyroid gland there is the development of nodules in a certain percentage of individuals. This incidence of nodules increases directly in proportion to the age of the individual so that in old age approximately 100 per cent of thyroid glands contain nodules within their structure. These nodules may be colloid, parenchymatous, mixed or degenerate or any combination of these. Roughly, it may be stated that the incidence of nodules can be represented by the same figure as the age of the individual, *i.e.*, approximately 30 per cent of the individuals at thirty years of age will be found to have nodules in their thyroid glands.

From this preliminary review of the normal thyroid it can be seen that the thyroid gland may have an extremely variable structure and still be physiologically normal. Keeping these facts in mind it will be possible to more readily understand the pathology of the diseased thyroid.

Patients with exophthalmic goiter and toxic adenoma of the thyroid present many clinical signs and symp-

toms common to both diseases. A typical history reveals that both suffer from nervousness, weight loss, dyspnea on exertion, tachycardia, tremor, hyperhidrosis and a goiter. These are the cardinal symptoms of hyperthyroidism and with the exception of the goiter all these symptoms can be reproduced by the administration of a toxic dose of thyroid extract or thyroxin.

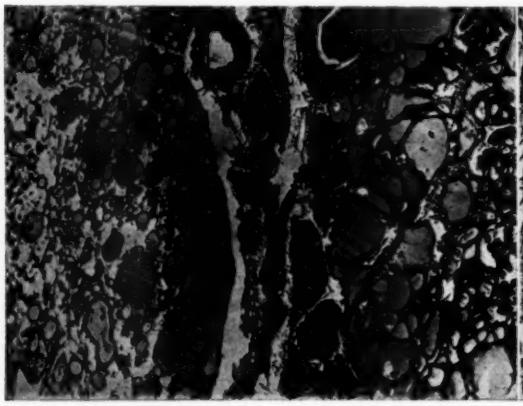

Fig. 1. Microphotograph. Mr. D. McR., aged sixty-one. Weight of gland 31 gms. Hyperthyroid symptoms one year. Exophthalmos; bruit. B.M.R. plus 43. Iodine given 24 days preoperatively. Nodule palpable clinically. Section shows fetal adenoma on the left with a few large colloid acini. Acini adjacent to the nodule show atrophic changes. Tissue on the right side shows hypertrophy and hyperplasia.

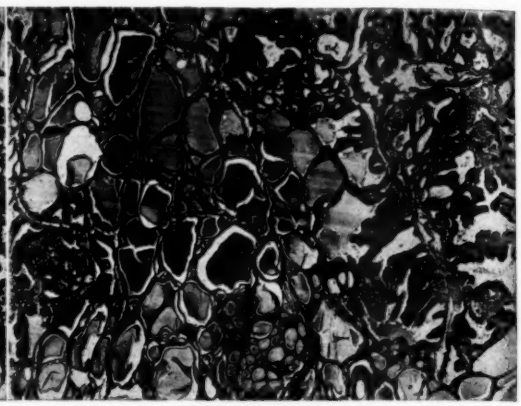

Fig. 2. Microphotograph from same gland as Figure 1 but at an area remote from the nodule. This discloses hypertrophy and hyperplasia of the parenchymatous portion of the gland, the characteristic finding of exophthalmic goiter.

One of these individuals is about thirty-three years of age, the other is fifty-three, approximately twenty years difference in their ages. This is considered one of the first differential features, the younger being the average age for patients with exophthalmic goiter and the older being that for patients with toxic adenoma. This factor has often led to confusion, for instead of being a hard and fast rule it is entirely possible for each disease to step over into the other's age group just as cancer and scarlet fever can occasionally be found outside their usual age distribution. Furthermore, it may be pointed out that toxic adenoma steps down into the younger age group much less often than exophthalmic goiter occurs in the older age. The reason for this is obvious, for by the time an individual has had the opportunity to develop a nodule and for that nodule to become toxic the patient has, in all probability, passed her fortieth birthday.

The physical examination reveals that one has a diffuse gland and the other a nodular gland. Necessarily the toxic adenoma must have a nodular gland but the exophthalmic goiter may also present nodules within its structure. This brings us to our first controversial point. H. S. Plummer has stated that he can differentiate between an exophthalmic goiter and a toxic adenoma without examining the neck. The occurrence of nodules in the glands of exophthalmic goiter patients is in the exact proportion that these nodules occur in the normal individual at a similar age. In exophthalmic goiter the parenchymatous portion of the gland, *i.e.*, that portion of the gland outside the nodule, shows hypertrophy and hyperplasia in a more or less marked degree. The presence of a nodule is only a coincidental feature and has nothing to do with the exophthalmic goiter except to aid in confusing the clinician.

Exophthalmos is observed in approximately 80 per cent of exophthalmic goiters. The remaining 20 per cent have no eye signs but present the same clinical symptoms and pathologic findings as those with exophthalmos. Exophthalmos is merely a sign which aids in the diagnosis but like other signs is not always present. It has often been said that exophthalmos occurs in a small percentage of toxic adenoma (3 to 10 per cent). Those cases showing exophthalmos which have been diagnosed clinically as toxic adenoma, in all probability, have been incorrectly diagnosed or the presence of large and prominent eyes has been confused with exophthalmos.

Among 121 cases of toxic adenoma which have been diagnosed clinically at the Minnesota General Hospital there were ten which showed definite exophthalmos. These have been thoroughly rechecked. Some of them appeared to be composed largely of adenomatous tissue with only a small strip of parenchymatous tissue at the periphery. When this parenchymatous tissue was examined microscopically it was found that it showed hypertrophy and hyperplasia in every instance. This finding was conspicuously absent in those cases of toxic adenoma which showed no exophthalmos. They uniformly showed normal thyroid acini in the parenchymatous portion, altered only by the compression of the adjacent nodules.

The presence of a bruit over the superior pole in a person with hyperthyroid symptoms always indicates an exophthalmic goiter in contradistinction to a toxic adenoma. The physiology of this is readily understood, for in exophthalmic goiter the blood supply is greatly increased out of all proportion to the size of the gland, whereas in toxic adenoma there is no increase in the blood supply to the nodule because each nodule has its own blood supply which is not influenced by the sympathetic nervous system and therefore not influenced by the excess secretion of thyroxin consequent to the hyperthyroidism.

A third sign and probably the most difficult to perceive is the presence of a peculiar high strung vivacious nervousness and mental activity in the individual with exophthalmic goiter and its absence in toxic adenoma. Plummer has expressed this feature by stating that these patients manifest numerous useful but purposeless movements as opposed to the useless and fidgety movements of chorea. If one were to observe these two types of cases side by side it would readily be perceived that the one would appear nervous, high strung, vivacious, fidgety and mentally alert, whereas the other, though giving the same subjective symptoms, would sit quietly and would not look nervous or

high strung, but, on the contrary, might even give the impression of being mentally a little dull. One may give the impression of being a neurotic because of her numerous complaints and high strung temperament, the other as being a neurotic because of the numerous complaints and apparent tranquillity.

favor of this statement it has been found that in those patients whose improvement was less than 75 per cent, 70.7 per cent had other ailments, whereas in those whose improvement was graded 75 per cent or more, only 38.2 per cent had other ailments. This suggests that some of the symptoms which had been attributed to the goi-

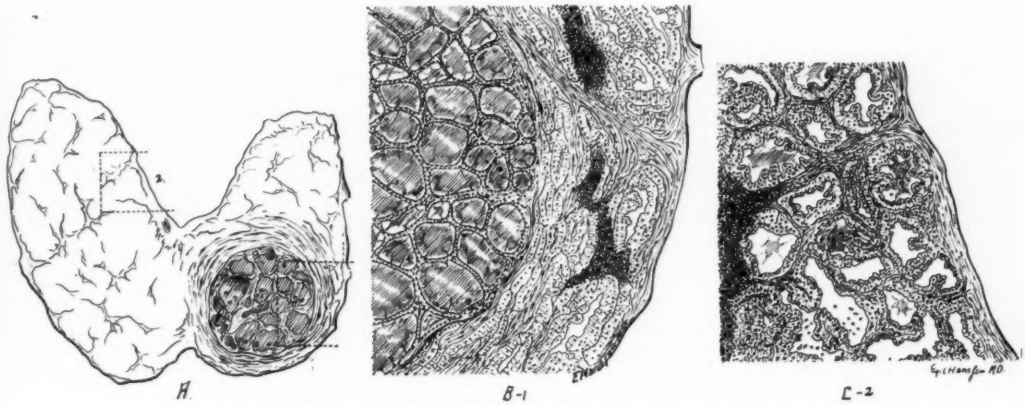

Fig. 3. Composite drawing demonstrating the histopathology in exophthalmic goiter in which a nodule was found. A. Tangential section showing the sites from which sections were made. B-1. Microscopic section through the adenoma showing compression and atrophic changes of the hyperplastic tissue. The colloid adenoma shows no evidence of hypertrophy and hyperplasia. C-2. Microscopic section of the gland showing hypertrophy and hyperplasia characteristic of exophthalmic goiter: acinar infoldings, columnar epithelial cells, decreased colloid content of the acini, lymphocytic foci and epithelial desquamation.

Thus it is seen that we have only three very definite signs by which to differentiate exophthalmic goiter from toxic adenoma clinically, *i.e.*, the bruit, the exophthalmos, and the peculiar high strung vivacious nervousness. Any two of these signs may be absent, but if all three are absent one should be very hesitant about making a diagnosis of exophthalmic goiter.

To complicate matters, the clinical signs as well as the histologic structure of the thyroid may be greatly altered by the administration of iodine.

H. S. Plummer has been able to correlate the clinical and pathological diagnoses in 97 per cent of his exophthalmic goiter patients. With the remaining 3 per cent he has been able to go back and pick up his error in either the clinical signs or in the pathological specimens.

Some authorities say that the two diseases are merely different phases of the same condition. To them belongs the responsibility of explaining the presence of hypertrophic and hyperplastic changes in the parenchymatous portion of the gland in exophthalmic goiter and its absence in toxic adenoma. The histologic structure has long been the accepted means of differentiating diseases. There is no reason for disregarding this axiom in thyroid diseases.

It might be argued that the two diseases are the same process because the end-results from operation in both toxic adenoma and exophthalmic goiter are approximately the same. This, of course, should not follow any more than would be the case if it were found that the end-results from gallbladder surgery approached the same proportions as that from thyroid surgery. Certainly these two diseases are not related. The point has been confusing, however, for Plummer, in an effort to point out the difference between the two diseases, has stated that a toxic adenoma does not recur following operation, whereas exophthalmic goiter may. The recurrence of the goiter and its associated hyperthyroid symptoms is an entirely different consideration than the end-results. The end-results may be dependent upon other associated conditions which may or may not have had some relation to the hyperthyroid state. In ter may have had their origin elsewhere. In addition to this it was found that the duration of the disease before operation was an important factor in determining the eventual degree of improvement.

The response of the patient to iodine has also been mentioned as a means of differentiating between exophthalmic goiter and toxic adenoma on the assumption that toxic adenoma does not respond to iodine whereas exophthalmic goiter is definitely improved.

In reviewing the cases at the Minnesota General Hospital it was found that the pulse and basal metabolic rate in patients with exophthalmic goiter describe a uniform decline after the administration of iodine. An occasional case shows an increase in the pulse rate. These probably represent the iodine fast group in which small doses of iodine have been given intermittently over a long period of time. On the other hand, the cases of toxic adenoma describe no definite curve. Many of them show a decrease in the pulse and basal metabolic rate. Some show an increase and others show no change whatsoever from the administration of iodine preoperatively.

The histologic diagnosis of toxic adenoma, per se, remains an uncertainty. Only 58 per cent of the cases show evidence of hypertrophy and hyperplasia within the nodule. Perhaps a more diligent search would increase this percentage somewhat. The important consideration is the clinical history, laboratory findings and the absence of hypertrophy and hyperplasia in the parenchymatous portion of the gland. Just as the pathologist wishes to know the clinical history in many of his other diagnostic problems, so is it necessary to know the clinical history in these conditions. It is also desirable to emphasize that the parenchymatous tissue, *i.e.*, that tissue outside the nodule, may be altered by the adjacent nodule only to the extent that the nodule alters it by its compression or by its interference with the blood supply. These things must be taken into consideration when examining the section. A section should also be taken from a remote portion of the thyroid where the effects of compression will not be experienced.

An examination of two case histories and their pathologic specimens will help to illustrate the point. The case histories have been made composite so as to more clearly illustrate the typical features. The drawings are composite drawings for the same purpose but the microphotographs are from the actual cases.

The histologic structure showed a fetal adenoma with compression of the surrounding lobules and a few atrophic changes in the compressed acini. Examination of a more remote section revealed typical hypertrophy and hyperplasia of the acini, decreased colloid content of the acini, lymphocytic foci and a few des-

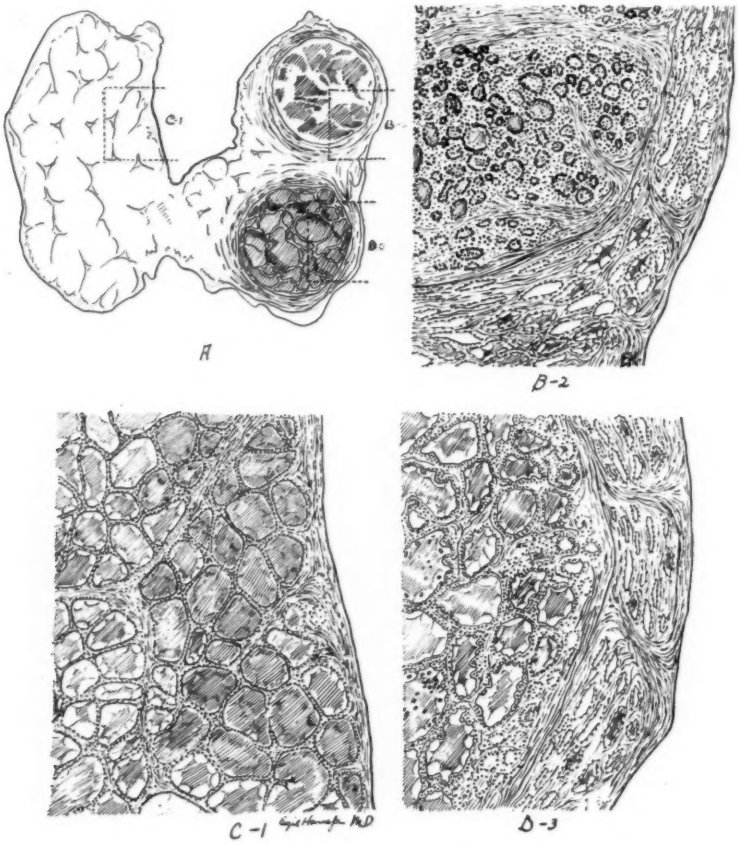

Fig. 4. Composite drawing depicting the histopathology in a toxic adenoma with the right lobe uninvolved. A. Tangential section indicating the sites from which sections were made. B-2. Microscopic section showing fetal adenoma with compressed and atrophic acini at the periphery. C-1. Microscopic section showing normal thyroid acini filled with colloid. D-3. Microscopic section showing colloid adenoma with hypertrophic and hyperplastic acini. (These hyperplastic changes can be found in 58 per cent of toxic adenoma.) Peripheral tissue shows compression and atrophic changes of the lobules and acini.

Case 1.—A woman, aged thirty, complained of nervousness, weakness, cardiac palpitation, weight loss, hyperhidrosis and a goiter. These are the cardinal symptoms of hyperthyroidism. Examination revealed a large nodule in the right lobe of the thyroid gland. She appeared very nervous, high strung and vivacious. There was no exophthalmos. Before iodine therapy had been instituted a bruit could be heard over the superior poles of the thyroid. The basal metabolic rate was plus 60, the pulse was 130. She improved markedly under iodine therapy.

Clinical diagnosis by the interne: Toxic adenoma. This diagnosis was made because she had a nodule in the thyroid gland and because there was no exophthalmos. No consideration was taken of the peculiar high strung vivacious nervousness and the bruit over the superior poles.

quamated epithelial cells: in fact, a typical picture of exophthalmic goiter. The clinical diagnosis was wrong because the clinician allowed himself to be confused by the absence of exophthalmos and the presence of a nodule. He should have recalled that nodules occur in the thyroid gland in a certain per cent of normal individuals. There is nothing which makes it impossible for one of these individuals to develop exophthalmic goiter.

Case 2.—A woman, aged fifty, complained of nervousness, weakness, cardiac palpitation, weight loss, dyspnea on exertion, hyperhidrosis and a goiter; again the cardinal symptoms of hyperthyroidism.

The physical examination revealed the patient sitting quietly. She did not appear to be nervous. There was no exophthalmos. There was a large nodule in the right lobe of the thyroid. There was no bruit over

the superior pole of the thyroid. The basal metabolic rate was plus 50, the pulse was 110. The response to iodine therapy preoperatively was inappreciable.

Clinical diagnosis: Toxic adenoma. This diagnosis was made because she had the clinical symptoms of hyperthyroidism and a nodule in the thyroid gland.

The histologic picture again showed a fetal adenoma with compression of the surrounding lobules and a few atrophic changes of the acini. A more remote section which was not influenced by the compressing nodule revealed normal appearing acini. On this basis and in conjunction with the clinical history the pathologist is able to confirm the diagnosis of toxic adenoma.

CONCLUSIONS

Clinical and pathological evidence has been presented to demonstrate that toxic adenoma and exophthalmic goiter are two distinct clinical and pathological entities. Both of these diseases offer diagnostic difficulties in their clinical and pathological aspects just as any other two diseases of the same organ may do.

Exophthalmic goiter may present at least three clinical signs which differentiate it from toxic adenoma, *i.e.*, exophthalmos, a bruit and the peculiar high strung vivacious nervousness and mental activity. These signs can be found in only those cases of hyperthyroid disease in which the histologic examination shows hypertrophy and hyperplasia in the parenchymatous portion of the gland. In other words, these changes do not occur in toxic adenoma. The presence of a palpable nodule in the thyroid gland in a patient showing these signs should not alter the opinion of the clinician to the extent of making a diagnosis of toxic adenoma.

The characteristic picture of exophthalmic goiter shows hypertrophy and hyperplasia, decrease in the colloid content of the acini, epithelial desquamation and lymphocytic foci in the parenchymatous portion of the gland altered only by the severity of the disease, by the administration of iodine and by the compression of any coincident nodules. The presence of a nodule in a gland presenting these findings should not convert the pathologist to the idea of making a diagnosis of toxic adenoma.

The histologic diagnosis of toxic adenoma can be made only with the aid of the clinical history and by finding the absence of hypertrophic and hyperplastic changes in the parenchymatous portion of the gland.

DISCUSSION

Dr. Martin Nordland: I am very pleased to have the opportunity of listening to this excellent presentation. Hyperthyroidism in the advanced stage is usually easy to recognize. Difficulties are encountered in the border line cases and early diagnosis is difficult. There are some distinct differences between the hyperthyroidism of the toxic adenoma and that of exophthalmic goiter. Early diagnosis in both situations is difficult.

Adenoma with hyperthyroidism is unlike exophthalmic goiter. It is a pure hyperthyroidism such as one gets from the administration of desiccated thyroid. The symptoms of toxic adenoma are those of increased B.M.R. over a long period of time, prolonged strain from this increased B.M.R., and the additional load thus placed on the circulatory system. The onset is insidious. There is deterioration of health for a long period of time. The patient, however, feels in better health due to the increased basal metabolic rate. Lack of endurance later makes him feel fatigued. Palpitation of the heart comes frequently. The course of the disease depends on the degree of the hyperthyroidism increase. It may be great or small. The long period of time before the symptoms develop and the long time it takes for the symptoms to develop, during which time the patient feels well, accounts for the number of years the disease may exist. This is conspicuous. All tissues are involved and the disease goes on to exhaustion.

Overwork is a common cause. Loss of weight comes late and then is rapid. This may average ten pounds per month. If the appetite fails they lose rapidly. Other troubles light up at this time. They have dyspnea and cardiovascular disturbances going on to heart failure. They may have arrhythmia while still quite well. Congestive heart failure depends upon other cardiac damage. Paroxysmal auricular fibrillation is the most common complication. If the heart disturbance is due to hyperthyroidism, then thyroidectomy is a cure.

The wave-like course of toxic exophthalmic goiter distinguishes it from toxic adenoma. The onset is sudden. There is a steady increase of symptoms in the toxicity of adenoma. Adenomatous goiter with hyperthyroidism never recurs after surgery but you may have recurrences of exophthalmic goiter.

The psychoneurotic is commonly confused with the patient who has exophthalmic goiter. Both conditions occur during the active period of life, around the thirty-fifth year. Fear in the psychoneurotic frequently causes symptoms similar to the cardinal symptoms of exophthalmic goiter. In the psychoneurotic the history is most valuable. Vivacity, loquaciousness, emotional instability, restlessness and semi-purposeless movements and nervous tension are common.

Goiter patients, as a class, are fearless, self-reliant, optimistic and fear surgery less than the majority of people. They are usually very good workers. The goiter patient usually has been well up to the short time before he presents himself. He is emotional but not scared.

Dr. Carl O. Rice: I am surprised that more dissenting opinions have not been expressed for I am sure that all of you do not agree with what I have said.

In the cases of toxic adenoma in which there is only one nodule, that nodule can be enucleated and the patient will get well. However, it is unusual to find only one nodule, and therefore the surgical technic is essentially the same in both toxic adenoma and exophthalmic goiter.

It is possible that all three of the signs which I have mentioned as being present in exophthalmic goiter and absent in toxic adenoma can be absent from the former; but my observations have convinced me that such an occurrence is rather rare. Where none of these signs, *i.e.*, exophthalmos, a bruit, and the peculiar high strung vivacious nervousness, are present, I hesitate a long time before advising surgical removal in exophthalmic goiter. The therapeutic test as manifested by the administration of iodine is frequently of benefit in the doubtful cases. This aids in eliminating those cases of neurosis which simulate exophthalmic goiter.

The administration of iodine may also change the physical signs and symptoms, in a typical case of exophthalmic goiter, so that it often becomes difficult to confirm the diagnosis. It will also change the histologic picture of the thyroid in exophthalmic goiter. This should not lead to the error of making the statement that the disease is different.

F. A. Olson, M.D., *Secretary*

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of inetrest to physicians.

Books Received For Review

MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC GUIDE. Jacob Gutman, M.D., Phar.D., F.A.C.P. Consulting Physician, Manhattan General Hospital, etc. 1393 pages. Price, cloth, $7.50. New York: Paul B. Hoeber, 1934.

DISEASES OF THE SKIN. Oliver S. Ormsby, M. D., Clinical Professor and Chairman of the Department of Dermatology, Rush Medical College of the University of Chicago, etc. 1288 pages. Price, cloth, $11.50. Philadelphia: Lea & Febiger, 1934.

I KNOW JUST THE THING FOR THAT! J. F. Montague, M.D., Medical Director, New York Intestinal Sanitarium, etc. 265 pages. Price, cloth, $2.00. New York: John Day Co., Inc., 1934.

REVIEW OF INFECTIONS OF THE HAND. A Guide to the Surgical Treatment of Acute and Chronic Suppurative Processes in the Fingers, Hand and Forearm. Allen B. Kanavel, M.D., Sc.D. Sixth Edition, Thoroughly Revised. 552 pages. Illus. Price, $6.00. Philadelphia: Lea and Febiger, 1933.

It seems rather futile to review the new edition of a book which has so long been a classic in its field and which has done so much to place surgery of the hand on a higher standard throughout the world. This new edition is a definite improvement over the older ones, the method of presentation is certainly better and the added material extremely important. It takes only a little study of it to reconcile one to the replacement of an old friend in the shape of an earlier edition with the newer volume and every surgeon should have this sixth edition handy for reference.

WALLACE H. COLE, M.D.

REPORT TO THE UNITED STATES GOVERNMENT ON TUBERCULOSIS WITH SOME THERAPEUTIC AND PROPHYLACTIC SUGGESTIONS. S. Adolphus Knopf, M.D. 59 pages. Illus. Price, $1.15. New York: National Tuberculosis Association, 1933.

This work consists of three distinct parts: (1) Report from the International Union Against Tuberculosis at The Hague, 1932; (2) Report on War Veterans Hospital and the Care of War Veterans; (3) The Prevention of Tuberculosis in Children. In the preface there is one brief paragraph on allergy and immunity. The author speaks about the conference at the Hague; 750 members were present from thirty-three different nations. He speaks at some length about courtesies exchanged with the Queen Mother.

The first chapter is on gold therapy. The reports are both good and bad, so that apparently no conclusion can be reached. The author quotes a brief extemporaneous statement of 700 words made by himself. He believes that Leon Bernard, for example, figures that 50 per cent improvement with gold therapy is no better, if as good, as our figures from sanatorium type of therapy. He speaks about the toxicity of gold,—nothing new.

Chapter 2 discusses general after-care of tuberculosis. There were no papers given at the Conference on special physical and mental preparation of the patient save by the author. It had more to do with the economic status, the classifications, tuberculosis villages, etc. He speaks of the English Villages for the treatment of tuberculosis, which are partially self-supporting. He mentions some after-care work in Germany, tells how wonderfully the various Veterans' units take care of this in the United States.

Chapter 3 describes a few rehabilitation projects in the United States.

From Chapter 4 to Chapter 12 inclusive the author describes his method of diaphragmatic breathing and respiratory exercises in the prevention and treatment of tuberculosis. He believes that one can do the patient an astounding amount of good by somewhat lessening the respirations by diaphragmatic breathing; there are pictures, descriptions, affidavits. The author also suggests massage and cold water therapy to increase the tone of some of the patients. He suggests that the patients be taught to hold their breath for certain length of time, thus producing an artificial hyperemia of the lungs. He discusses the Knopf Indoor Tent—"Less chance for a relapse if the tuberculous individual breathes pure fresh air." He mentions BCG in passing in Chapter 10 for its preventive value in children. He says it is not being used in England and quotes Park's 413 cases with good results. He also adds toward the end of the chapter the value of breathing in the prevention of tuberculosis. Chapter 12 is devoted to exercises for expelling residual air.

In Chapter 13, the author briefly mentions the value of the salt-free diet in the treatment of tuberculosis of the skin and tuberculides of the skin, with glowing reports of its value.

My personal opinion is that the reports from The Hague are far too brief and that the author could have covered his adjunct to therapy in far less space and that the book is hardly scientific but written more for the lay public. It may be of distinct value to certain groups and of benefits to certain patients.

G. R. DUNCAN, M.D.

THE MANAGEMENT OF FRACTURES, DISLOCATIONS AND SPRAINS. John Albert Key, B.S., M.D., and H. Earle Conwell, M.D., F.A.C.S. 1164 pages. Illus. Price, $15.00. St. Louis: C. V. Mosby Co., 1934.

This new text-book by Drs. Key and Conwell is exactly what the authors claim it to be. That is, a book written for the student, the general practitioner, and the surgeon. The book certainly furnishes a practical working guide for the treatment of fractures, dislocations and sprains. It is complete and is well illustrated. The chapter on the Medico-Legal Aspects of fracture cases is particularly valuable. It is regrettable that the chapter on Estimation of Permanent Disability in fracture cases is so brief and also that so little of Boehler's work has been included in this modern book. This volume is the best on fractures that has ever been published in this country and will remain the standard for many years.

M. O. HENRY, M.D.